COMMERCIAL FISHERIES Review

VOL. 30, NO. 4

APRIL 1968

THE UNIVERSITY OF MICHIGAN
MAY 21 1968
MUSEUMS LIBRARY

COVER: Fishermen hold fast to net and scoop ("scup") most of fish with smaller net guided by huge handle.

COMMERCIAL FISHERIES

Review

A comprehensive view of United States and foreign fishing industries--including catch, processing, marketing, research, and legislation--prepared by the Bureau of Commercial Fisheries.

Fishermen's Memorial
Gloucester, Mass.

Managing Editor: Edward Edelsberg

Production Manager
and Associate Editor: Jean Zalevsky

Production: Alma Greene (Senior Compositor)
and Mary Andrews

The Bureau of Commercial Fisheries and The Bureau of Sport Fisheries and Wildlife make up The Fish and Wildlife Service of The United States Department of the Interior.

Throughout this book, the initials BCF stand for the Bureau of Commercial Fisheries.

Address correspondence and requests to: Commercial Fisheries Review, 1801 North Moore Street, Room 200, Arlington, Va. 22209. Telephone: Area Code 703 - 557-4246.

Publication of material from sources outside the Bureau is not an endorsement. The Bureau is not responsible for the accuracy of facts, views, or opinions of these sources.

Although the contents have not been copyrighted and may be reprinted freely, reference to source is appreciated.

Use of funds for printing this publication was approved by the Director, Bureau of the Budget, May 1, 1963.

For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.
Price 60 cents (single copy). Subscription Price: $6.50 a year; $2 additional for foreign mailing.

CONTENTS

	Page
UNITED STATES	
Events and Trends	1
States	13
Bureau of Commercial Fisheries Programs	17
ARTICLES	26
Detection of Fish Schools by Sonar (Eastern Tropical Pacific, July-November 1967), by Robert I. McClendon	
How Lake Superior Gill Net Vessel Was Converted to Trawler, by Warren Handwork	
INTERNATIONAL	36
FOREIGN	
Canada	42
Europe	43
Mid East	49
Latin America	50
Asia	53
South Pacific	62
Africa	65
INDEX	67

Dumping catch aboard BCF's research vessel "Oregon" off Florida's east coast. (Photo: J. B. Rivers)

PRESIDENT ASKS $516 MILLION FOR MARINE SCIENCE AFFAIRS IN FISCAL 1969

President Johnson asked Congress in March for $516 million in fiscal year 1969 (July 1, 1968-June 30, 1969) to pay for marine science affairs. This is 15 percent above the FY 1968 figure.

The President transmitted to Congress the recommendations in the second annual report of the National Council on Marine Resources and Engineering Development (better known as Marine Science Council). The Council is a Cabinet-level advisory group headed by Vice President Humphrey.

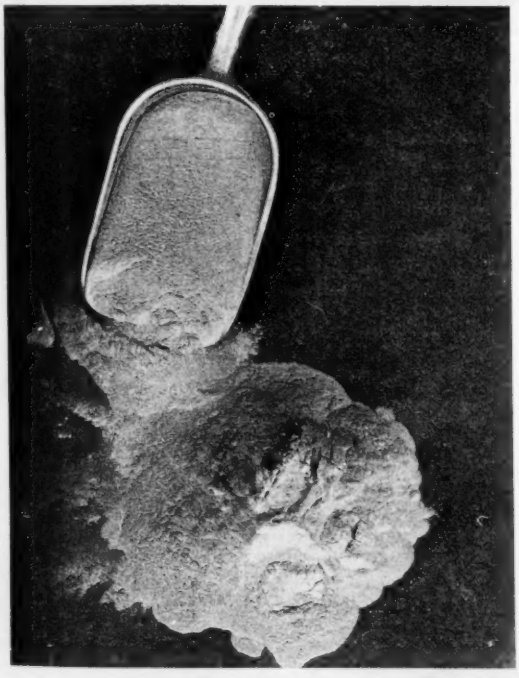


Fig. 1 - FPC.

The Vice President said of the report, "Marine Science Affairs--A Year of Plans and Progress": It is "an account of policies, programs, and accomplishments of the Federal Government for utilizing the oceans more effectively in meeting goals and aspirations of our Nation."

The President stated that the additional money is needed to:

Speed research to make fish protein concentrate (FPC) available in the War on Hunger.

Fig. 2 - BCF expert W. R. Heard explains how SCUBA is applied to fishery research. (Dr. D. Hoopes)

Broaden education and research in marine sciences, particularly in Sea Grant and other university programs. (See "Manpower Is 'Vital Ingredient' of Marine Sciences, Says Wenk," CFR Feb. 1968.)

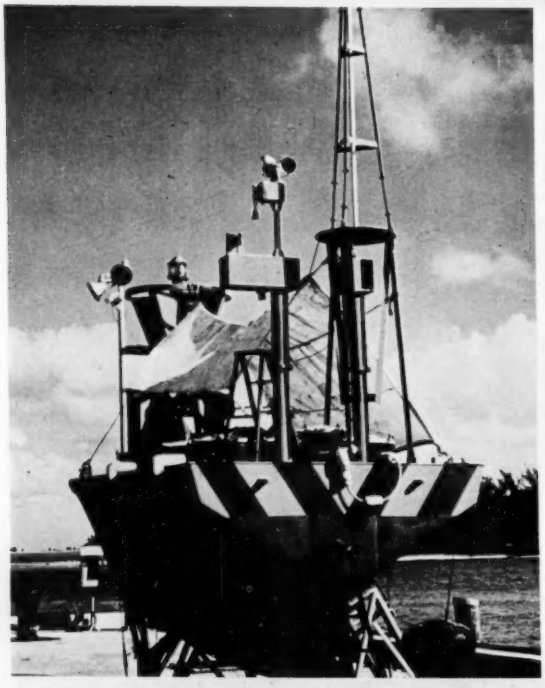


Fig. 3 - Nomad (Navy Oceanographic Meteorological Automatic Device) buoy transmits data up to 2,000 miles over standard 100 words-per-minute radioteletype circuits. (U. S. Navy)

Develop improved ocean buoys to collect accurate and timely data for better prediction of weather and ocean conditions.

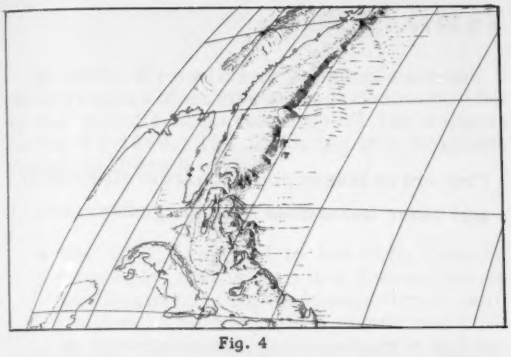


Fig. 4

Continue mapping Continental Shelf to aid resource development--"and other industrial, scientific, and national security purposes."

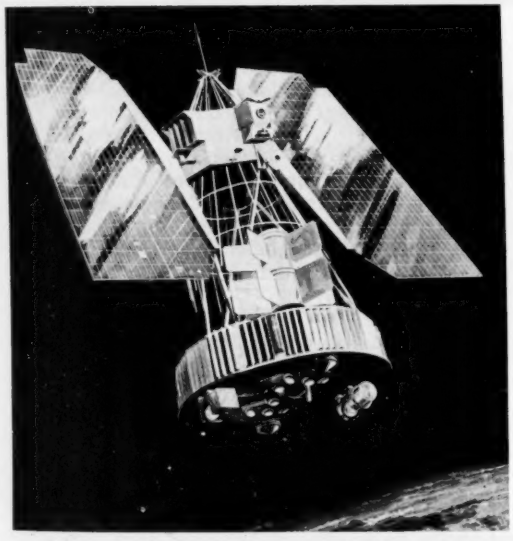


Fig. 5 - Nimbus weather satellite (NASA).

Apply space craft technology to oceanography--and improve observation and prediction of ocean environment.

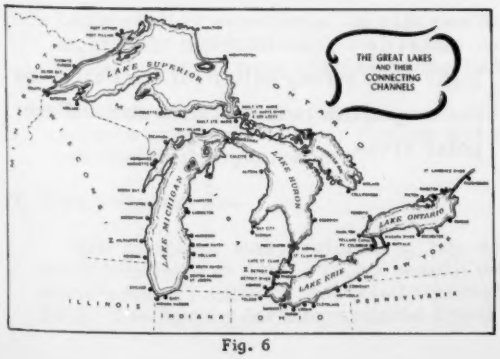


Fig. 6

Increase research and planning to improve U. S. Coastal Zone and to promote development of Great Lakes, ports, harbors.

Fig. 7 - Oil covers Yorktown, Va., public beach after 1967 spill. (Virginia Institute of Marine Science)

Prevent or lessen pollution from oil spillage and other hazardous ship cargoes.

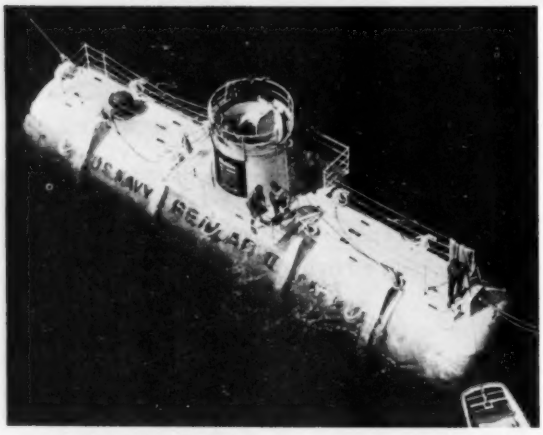


Fig. 8 - Navy's Sealab II. (U. S. Navy)

Expand Navy's advanced technology for work in deep oceans--"and for rescue, search and salvage."

Fig. 9 - The 310-foot, 8,449-ton, 21,000-horsepower U. S. Coast Guard "Glacier," America's largest icebreaker, opens a channel in the Antarctic's McMurdo Sound. The vessel now is engaged in a 2-year international oceanographic study of the Weddell Sea. (R. F. Clayton)

Build very strong cutter for Ice Patrol and oceanographic research in Arctic and sub-polar areas.

REPORT ON FY 1968 ACTIVITIES

In 1967, President Johnson selected 9 priority areas of marine science recommended by the Marine Sciences Council for support during FY 1968. The following is a progress report on these 9 areas:

1. International Cooperation

- The U. S. proposed to the U.N. General Assembly that it create a Committee on the Oceans to promote international cooperation. The committee should work for an international legal structure to aid exploration and use of the seabed.
- Marine science cooperation was emphasized during the Latin American Summit Meeting at Punta del Este and in the communiqué following Japanese Premier Sato's U. S. visit.
- The U. S. and other nations persuaded the International Telecommunication Union to reserve certain radio frequencies for transmitting oceanographic data.
- "Plans were developed to propose establishment of international marine preserves."
- 50 foreign scientists took part in "Oceanographer's" global scientific expedition.
- British, Australian, and Canadian divers began aquanaut training in the U. S. to prepare for SEALAB III in summer 1968.
- Red tape was cut in arranging visits by Soviet fishery research ships to U. S. ports for projects of mutual benefit.
- Legal studies were begun "to gain new insight" into international problems involved in developing marine resources.
- "Studies were completed of the marine science programs of other nations and of international organizations."

2. Food from the Sea

The program was designed to tap the sea's inexpensive protein to benefit the world's hungry millions, especially through FPC. The Agency for International Development (AID) is the lead agency for the program; BCF is developing the technology.

Last year--

- AID opened a new office which, after surveying many countries, selected Chile for pre-investment market surveys.
- FPC produced from hake was approved for people by the U. S. Food and Drug Administration (FDA).
- BCF planned to build a pilot plant in the Pacific Northwest to produce FPC.

3. Sea Grant Program

The National Sea Grant College and Program Act was passed. Its purposes: to speed training and education of specialists, especially ocean engineers and technicians; to advance applied research; to spread marine science information.

To carry out the program, the National Science Foundation set up an Office of Sea Grant Programs, issued guidelines for obtaining grants, and made its first awards.

4. Data Systems Study

The Council studied the needs of Government, private industry, and scientists for marine science and technology data.

5. Estuary Study

Programs were planned to use a new laboratory under the Corps of Engineers--"to study estuarine navigation, water quality, shore erosion, and the effects of pollution and natural influences on fish, shellfish, health, recreation, and beauty of the Chesapeake Bay."

6. Surveys of Mineral Resources

"The objective is to accelerate planning, surveys, and survey methodology related to marine minerals." In FY 1968, surveys were continued off the Atlantic and Northwest coasts. New mineral deposits off Alaska were outlined. The Council spon-

sored a study of the economic potential of minerals of the U. S. Continental Shelf and Slope.

7. Ocean Observation and Prediction

A stepped-up program in FY 1968 resulted in an experimental breaker and surf forecasting service for southern California beaches to protect coastal commercial fishermen and bathers; completed a study showing the technologic feasibility of ocean data buoys to monitor ocean and atmospheric processes; set up the Regional Center for Tropical Meteorology in the National Hurricane Center in Miami, Florida, and strengthened the center. Improved weather information will be provided to shore communities, industries, and marine operators in the Tropical Atlantic.

8. Deep Ocean Technology

The loss of the U.S.S. "Thresher" and of unarmed H bombs off Palomares, Spain, emphasized the need to have better "search and salvage systems in the deep ocean." The Navy speeded its Deep Submergence Systems Project.

9. Subpolar Oceanographic Research Vessel

A Coast Guard ship replacement for one on International Ice Patrol was to be designed to permit oceanographic research in subpolar regions. Congress did not vote funds and another request for the vessel is being made.

BCF IN 1967

The U. S. seeks to help the domestic fishing industry improve its position in world production through scientific, technologic, and economic means. The U. S. also seeks to harvest the oceans' riches more fully to help feed the world's hungry millions. The Bureau of Commercial Fisheries (BCF) is the prime agency in these endeavors.

The money requested for the FY 1969 fishery development and seafood technology programs of BCF would continue these major programs:

1. Resource Development and Management

Its purposes are: "to gather data to predict abundance and distribution of fish stocks"; to learn how many fish of one species can be caught each year without endangering the population; to gather information needed for international negotiations on high-seas fishery resources.

During 1967, this program

- "improved prediction of abundance and distribution for skipjack, bluefin and albacore tuna in the Pacific, and groundfish and sea scallops in the North Atlantic." It developed a prediction model to obtain maximum yield from the Tortugas, Florida, pink shrimp fishery.
- began to assess brown shrimp in the Gulf of Mexico;
- developed lobster and menhaden tagging programs;
- developed sonar equipment for monitoring salmon migration in Alaska streams with State cooperation;
- continued pesticide monitoring along the estuaries of the East Coast and the Gulf of Mexico;
- completed 2 phases of the fishways at Willamette Falls in the Columbia River system;
- tested successfully the experimental drifting buoys designed to obtain ocean data up to 400 miles;
- developed spacecraft oceanography to analyze biologically important ocean conditions;
- coordinated large-scale international investigations of tuna in Eastern Tropical Pacific.

2. Processing and Marketing

Its research seeks to convert raw fish into marketable products. In 1967, this program did the following:

- helped to expand commercial use of Spanish mackerel, soft clams, mullet, and catfish;
- helped to develop East Coast markets for fish products from the Pacific Northwest.

It did this by bringing together processors, buyers, and airline representatives;

- won FDA approval for human consumption of FPC;
- gave technical assistance to AID in selecting countries for FPC programs;
- developed new fish products;
- developed irradiation techniques aboard ships to increase the shelf life of fresh fish.

3. Advanced Technology

It is designed to help industry find fish more quickly and catch them more efficiently through new "harvesting methods, fishing tactics, and locating techniques."

During 1967, the program

- developed methods to estimate size of surface fish schools by aerial photography;
- tested successfully a prototype electrical trawl to harvest Great Lakes alewives;
- developed mechanized seining and conveyer equipment to reduce time and labor in harvesting farm-pond fish;
- improved midwater trawls and precision depth telemetry system to harvest Pacific hake;
- introduced improved pot gear and bait to expand commercial fishing for crab off southeast Alaska.

4. Economic Research

This is conducted to improve economic efficiencies in commercial fishing industry--"management, harvesting, processing, transporting, and marketing."

During 1967, fishermen were advised in planning and forming cooperatives. The economic research programs at East Coast universities were coordinated.

COLD WATERS PASTURE RICH ALGAE FAUNA

Current studies by Dr. John S. Bunt, Institute of Marine Science, University of Miami, indicate that marine microalgae, a base of the ecological food chain, develop in Antarctic waters below the normally accepted limit of the light zone.

Adjacent waters of the Antarctic continent, during the summer, may be the world's richest area of marine life. Low temperature, which enables it to hold more dissolved oxygen and carbon dioxide than seas to the north, may be one reason for this abundance of life.

SCUBA divers at McMurdo Sound penetrated through 16 feet of ice to collect samples of microalgae and protozoa living in the frigid water. An analysis of these algae indicates that the annual primary production of the Antarctic waters may exceed 30 million tons of organic carbon. (Reprinted with permission from "Science News", weekly summary of current science, copyrighted 1966 by Science Service, Inc.)

Steelhead Eggs Are Fertilized With Frozen Sperm for First Time

A significant breakthrough has been achieved in the preservation of fish sperm in a living state, reported BCF's Regional Director in Seattle, Donald Johnson. A team of Oregon State University (OSU) scientists, working under BCF contract, in cooperation with the BCF Columbia Fisheries Program Office in Portland, has made the first successful attempt to fertilize salmonid eggs with cryo-preserved (refrigerated) spermatozoa.

They fertilized the eggs of steelhead trout with spermatozoa that had been frozen and refrigerated in liquid nitrogen for 14 and 28 days. These eggs developed into alevins--newly hatched fish still attached to the yolk mass--which appeared to be normal.

Important Advance

Dr. Fred C. Cleaver, director of the BCF Columbia Fisheries Program Office, said the development promises to facilitate more efficient fish cultural practices and enhance research into fishery genetics and disease control.

"We're at the point of improving fish stock that animal husbandry was 40 years ago," noted Dr. Cleaver, "and this new development moves us another notch ahead in our attempts to breed better, stronger fish." He pointed out that preservation of fish sperm for long periods would make it possible to retain the sperm for fertilization of eggs that ripen at a later time; also, sperm could be transported from one fish hatchery to another for more effective use.

For the past century, fishery scientists have attempted to preserve spermatozoa of fishes in a viable condition for extended periods of time. Except for some work with herring in 1953, these attempts either have failed or yielded inconclusive results.

Study Began in 1966

In 1966, BCF contracted with OSU to develop methodology for the cryo-preservation (refrigeration) of viable salmonid sperm. Three scientists from the university's Department of Fisheries and Wildlife, Howard F. Horton, James R. Graybill, and Arthur S. H. Wu, went to work on the project. Dr. Raymond C. Simon, professor of fisheries, conducted chromosome analysis and gave other assistance.

They developed a "Solution 48" composed of 7 components. They discovered that the best survival of viable sperm was obtained in samples frozen in this solution in combination with dimethyl sulfoxide (DMSO). Alevins were produced from eggs fertilized with this frozen sperm.

The scientists noted: "These alevins appeared to be as normal as young fish produced from unfrozen spermatozoa. The fertility rate was low (0 to 18 percent), but to our knowledge this is the first successful attempt to fertilize salmonid eggs with cryo-preserved spermatozoa."

The OSU team said these findings "warrant further investigation." "We believe that the percent fertilization can be increased by placing the sperm with the eggs immediately after the semen is thawed." This hypothesis is expected to be tested.

Other Study Findings

The study team reached additional conclusions:

Undiluted semen can be transported in a styrofoam cooler for 3 hours without detectable loss of viability.

No differences were detected in the gross morphology (form and structure) of spermatozoa of coho salmon, chinook salmon, rainbow trout, and steelhead trout.

Spermatozoa in undiluted semen will remain viable for at least several days when refrigerated at four degrees centigrade.

The concentration of sperm in semen of coho salmon and rainbow trout is 2.3 to 230 times greater than that for most farm animals.

An extender should be developed which will maintain viable sperm in greatly diluted semen.

There is a direct relationship between concentration of additive in the extender and optimum rate of freezing semen samples.

Interior Suggests Legislation to Control Oil Pollution

Interior Department has submitted to Congress proposed legislation to help control pollution of U. S. waters by oil spills and other hazardous substances. The measure is designed to carry out major recommendations made in "Oil Pollution--A Report to the President," prepared jointly by Interior and the Department of Transportation.

Main Provisions

The main provisions of the suggested legislation would:

- Prohibit oil discharge from a shore facility or a ship within 12 miles of shore. This would cover the 3-mile territorial and the 9-mile contiguous zones. The previous standards of liability were limited to "gross or willful negligence" and to the 3-mile limit.

- Hold responsible for cleaning up affected areas the discharger of oil, including ship and shore facility owners.

- Empower the U. S. to clean up oil spills whenever pollutor fails to act, but would required the pollutor to reimburse U. S. Present law limits owner's liability to ship's salvage value; the proposal will extend it to the full costs of cleanup.

- Protect against large and dangerous discharges of pollutants other than oil by requiring pollutor to do what U. S. considers necessary to remedy situation. If pollutor does not act, the U. S. will take the necessary steps and hold former liable for costs.

Foreign Fishing Off U. S. Atlantic Coast Discussed

Representatives of commercial and sport fishing interests and Federal and state fisheries officials met at the State Department in Washington, D.C., on March 21 to discuss problems of foreign fishing off the Atlantic coast of the U.S. from Maine to Cape Hatteras.

Ambassador Donald L. McKernan, Special Assistant for Fisheries and Wildlife to the Secretary of State, said: "I called this meeting to discuss with fishing interests and state officials the growing problems in the area. After a review of the facts, we had a frank discussion of the problems and actions which might be taken to relieve the burdens facing our fishermen since foreign fleets started heavy fishing here about seven years ago. Recently, the problems have intensified and have expanded to new areas, bringing new segments of our public into contact with international fisheries problems."

Agencies Collaborate

Ambassador McKernan added that the meeting did not arrive at a firm course of action for the future, but the discussion of various possibilities was useful. "We did not expect this meeting to reach broad decisions," he said. "Ideas explored here will be studied and further refined in subsequent meetings, where more specific lines of action will be developed. The real purpose of this meeting was to establish a new era of collaboration among the Federal agencies concerned, the state governments, and the fishing interests concerned. The meeting succeeded very well in doing this, as I see it, and laid a good basis for future cooperation."

Many Participated

BCF, the U. S. Bureau of Sport Fisheries and Wildlife, the U. S. Coast Guard, and the Department of State participated. Officials from Maine, New Hampshire, Massachusetts, Rhode Island, New York, New Jersey, Virginia, and North Carolina, also took part.

In addition to representatives of sport and commercial fishing interests, regional groups and national organizations had been invited. (U. S. Department of State, March 21, 1968.)

1968 Great Lakes Fish Stocking Underway

Great Lakes sport and commercial fishing is being revitalized this spring with salmon and trout plantings totaling nearly 8 million fish, reports the Great Lakes Commission. Of the 2 principal participants, Michigan is concentrating on salmon and Wisconsin on trout; Pennsylvania, Ohio, and New York are initiating their salmon programs.

Stocking lake trout in Lake Superior.

Some 4.1 million lake trout yearlings are being planted in the Great Lakes waters of five states by the U. S. Bureau of Sport Fisheries and Wildlife; Ontario is releasing 500,000 young trout along the northern shore of Lake Superior. Lake Superior is receiving 2,320,000 and L. Michigan 1,800,000. Last fall 263,000 fingerlings of the 1967-year class were planted in Lake Superior by Minnesota and Wisconsin.

Cohos

In Michigan, 1,850,000 coho fingerlings are being released in 18 streams; 10 tributaries of Lake Michigan will receive 1.1 million; 5 Lake Superior streams--350,000; and 3 tributaries of Lake Huron--400,000, the first sizeable planting for Lake Huron.

Wisconsin will plant 25,000 yearling cohos in a Kewaunnee County stream--and 200,000 will be stocked in Great Lakes tributaries in 1969. This year's emphasis is on trout. The state is releasing more than 200,000 lake trout in Lake Superior streams. Also, 180,000 other trout--rainbows, browns and brooks--will be stocked in Lakes Michigan and Superior.

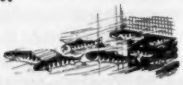
Lake Erie

Cohos will be introduced into Lake Erie on a limited basis this year until the program is evaluated. Pennsylvania will release 87,000 fingerlings into tributaries west of Erie; Ohio will stock the Chagrin River with 25,000 coho smolt.

New York has placed 6,000 coho fingerlings in Cattaraugus Creek, west of Buffalo; 25,000 yearlings are scheduled for release in the Salmon River at the east end of Lake Ontario. New York's present supply of about 180,000 coho fry will go into Great Lakes streams in 1969.

Minnesota's Plans

Minnesota expects to release its first coho in Lake Superior in 1969: about 100,000 yearlings are scheduled for the French River at a site about 12 miles from Duluth. Minnesota now is constructing fishways on several North Shore rivers, primarily to enable rainbow trout (steelhead) to bypass falls on these streams. The work is being done under the Anadromous Fish Act; Federal funds pay for half the cost.



Great Lakes Production 1967 and 1966

The following are preliminary Great Lakes catch statistics:

State	Lake	Production	
		1967	1966
		. . (1,000 Pounds) . .	
New York	Erie	254	220
Pennsylvania	Erie	478	573
Ohio	Erie	9,831	10,516
Michigan	Erie	1,052	1,389
Michigan	Huron	3,211	3,769
Michigan	Michigan	19,558	11,522
Indiana	Michigan	675	87
Illinois	Michigan	106	302
Wisconsin	Michigan	36,818	30,853
Michigan	Superior	3,991	4,604
Wisconsin	Superior	1,980	1,970

Lake Michigan Exceeds Erie

The total catch from Lake Michigan--57,157,000 pounds exceeded Lake Erie's 54,124,000 pounds for the first time since 1903. That year was the only time the total Lake Michigan catch exceeded the total Lake Erie catch. In 1903, the reported Canadian catch was low--and the cause may have been incomplete data.

For every year before and after 1903, Lake Erie production (including Canada) was much greater than Lake Michigan's.

OCEANOGRAPHY

Scripps' "Argo" Uses Computer and Satellites on Global Cruise

A sea-going computer and a satellite navigation system are being used by the research vessel Argo, which departed San Diego, Calif., March 7 on a year-long, 61,000-mile, scientific exploration. She will cruise the Pacific, Indian, and Atlantic Oceans for the Scripps Institution of Oceanography, University of California at San Diego. Dr. William A. Nierenberg, director of Scripps, described the cruise as "primarily a deep-sea, geological-geophysical exploration of the world ocean. . . .This expedition marks the first time that calculations of a ship's position at sea will be obtained automatically, using the vessel's speed and direction in conjunction with data received from the satellite, all being fed directly to the computer, to establish her position and thus improve the scientists' knowledge of the exact locations where data are being taken."

Dr. Robert L. Fisher, associate research geologist at Scripps, is in overall charge of the expedition called "Circe." Dr. Fisher said: "This computer will be used for geophysical and oceanographic data compilation and data reduction throughout the expedition. The satellite navigation system's shipboard receiver will be installed at Penang, Malaysia, about May 1, and will function during the remainder of the cruise. Rapid, frequent, precise fixing will permit on-the-spot revision and modification of investigations to take advantage, immediately, of knowledge just gained. Formerly, gaps or omissions--which can be easily remedied with the ship in the area--might not become apparent until months after a cruise was completed and the data analyzed."

The Computer

The IBM 1800 has a 32,000-word core storage capacity with a cycle time of two microseconds (millionths of a second). It is directly connected to the ship's scientific instruments and can gather information from them at up to 8 million bits a second.

The Satellites

The ship's navigator will be aided by 3 Navy satellites. The satellites will be orbiting roughly a north-south course 600 nautical miles above the earth every 80 minutes and transmit signals to the shipboard receiver. This system will enable the navigator to determine his position precisely in any weather even substantially better than a tenth of a mile. This is much more accurate than the conventional celestial "fix" or listening to land-based LORAN stations.

Dr. Fisher emphasized that such accuracy will be especially helpful in the Bay of Bengal, which is cloud-covered much of the time during the northeast monsoon season. Other electronic aids to navigation are not available there. Argo will be in the bay 6 of the 12 months.

What Scientists Seek

Expedition scientists will investigate "ocean bottom topography, magnetic patterns, heat flow, thickness of sediments in ocean basins and along continental shelves, distribution and types of hard rock, chemical properties of sediments and the water above them, and variations in the earth's magnetic field near the magnetic equator. Hydrographic casts will be made, bathythermographic observations collected, and biological tows completed."

The expedition's scientists and graduate students represent the U. S., Great Britain, Canada, Australia, Colombia, France, The Netherlands, and South Africa.

Coast Guard Leads Data Buoy Development

The President's Council on Marine Resources and Engineering Development has assigned to the U. S. Coast Guard leadership of a development program for national data buoy systems. The development program begins on July 1.

The systems would contain unmanned automatic data buoys to provide marine meteorological and oceanographic data necessary for weather forecasting. These would also aid other Government-wide operations.

The program is based on a Coast Guard-managed study sponsored by several Federal agencies needing marine data.

The study concluded that the systems are the cheapest means of satisfying many Federal requirements for marine meteorological and oceanographic data. Also, the systems are attainable within 5 years.

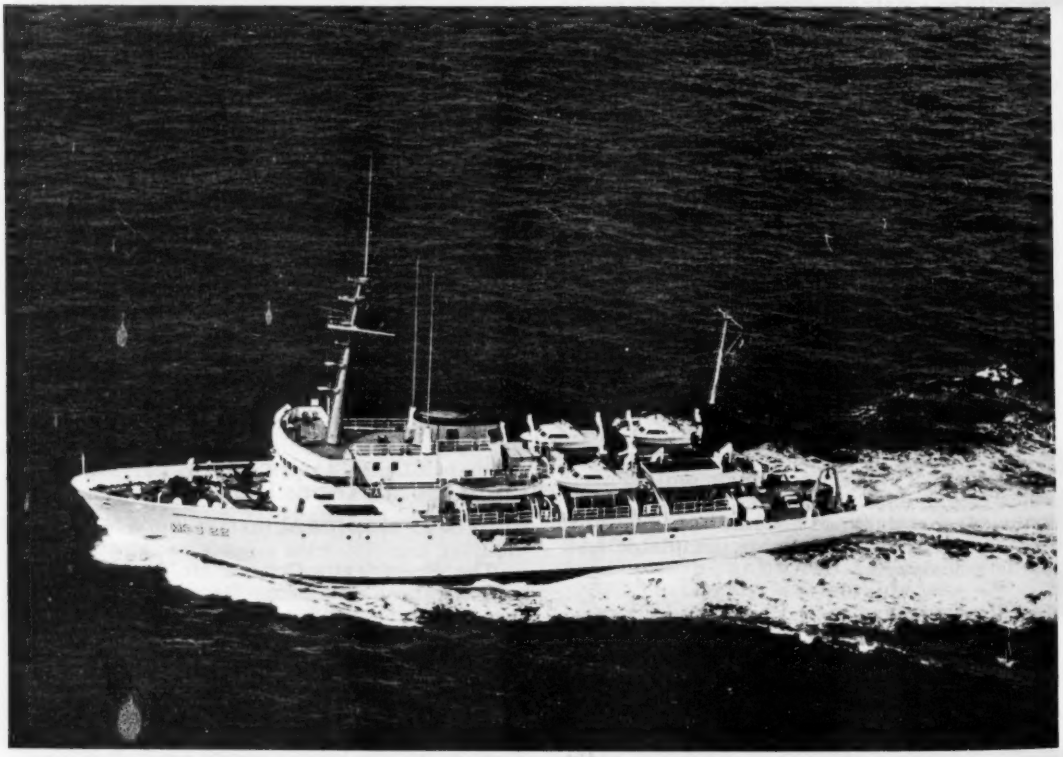
New Hydrographic Survey Vessel Commissioned

A new U. S. hydrographic survey vessel equipped with electronic devices to probe America's coastal waters was commissioned by the Environmental Science Services Administration (ESSA) on March 23 at Jacksonville, Fla. She is the "Mt. Mitchell."

The Mt. Mitchell is the first of 3 sister ships built at Jacksonville to be commissioned for the ESSA fleet of ocean and hydrographic survey vessels. The others are the USC&GSS "Fairweather" and "Rainier." Two larger vessels were built in Jacksonville before the Mt. Mitchell: the USC&GSS "Oceanographer" and "Discoverer," for ocean surveys in the Pacific and Atlantic.

The $4.3 million, 231-foot, 1,660-ton, white-hulled Mt. Mitchell will take part in the U.S. Coast and Geodetic Survey's long-range program of marine charting and scientific exploration in the Atlantic.

The ship can cruise 8,000 miles and carry 79 officers, crew, and scientists. Her primary function will be to conduct hydrographic surveys in coastal waters in the Atlantic and the Gulf of Mexico. She also has some equipment for oceanographic surveying.



USC&GSS Mt. Mitchell. (Photo: ESSA)

STATES

Florida

MASS CULTURE OF PINK SHRIMP AND POMPANO STUDIED BY MIAMI U.

A $225,000 grant for a 2-year project to develop techniques for the mass culture of pink shrimp and pompano was awarded to the Institute of Marine Sciences (IMS), University of Miami (Fla.), by the National Science Foundation.

The aquiculture (sea farming) project is under Dr. Clarence P. Idyll. It will be conducted at the Florida Power and Light Co.'s Turkey Point plant. The purpose is to show that a predictable supply of high-quality pink shrimp and pompano can be mass produced in the shallow parts of the ocean at a predictable cost. The information and techniques learned will be passed on to commercial fishermen. The 2 highest-priced seafoods in the U. S. were chosen for study because of their value and the cost of aquiculture.

The Sea Grant Program requires that "matching" funds be provided by large industrial firms interested in diversifying their operations. Much money has been contributed to the project by Armour and Co. and the United Fruit Co. The Florida Power and Light Co. has made its property available and paid to build outdoor ponds.

IMS INTEREST IN SHRIMP

The Institute of Marine Sciences became interested in the commercial culture of pink shrimp in 1964, after 15 years of research on the Tortugas species. During that time, in the late 1950s, IMS biologists succeeded in raising shrimp from the egg to the young-adult stage in the laboratory. In 1965, Dr. Idyll went to Japan to study Dr. Motosaku Fujinaga's successful shrimp farm at Takamatsu. In summer 1967, Dr. Won Tack Yang, who will be involved in the shrimp experiments at Turkey Point, visited Japan to learn the latest developments in shrimp farming.

The shrimp research was scheduled to begin by stocking each of 4 $\frac{1}{4}$-acre ponds with 5,000 shrimp (about $2\frac{1}{2}$-inches long) in early March. These are the species of shrimp fished in the Tortugas. They should grow to $5\frac{1}{2}$ to 6 inches long after about 3 months in the Turkey Point ponds.

When a hatchery building is completed, egg-bearing female pink shrimp will be collected in the Tortugas and placed in indoor spawning tanks. The eggs will then be raised in the hatchery through the 11 larval stages and about 12 postlarval stages. The shrimp will still be less than $\frac{1}{2}$-inch long but can be put into outdoor growing ponds. There, experiments can be conducted on different kinds and quantity of foods, various water temperatures and salinities, and pond size in relation to shrimp size. Tests of food preferences of pink shrimp now are being carried out in the lab.

This project does not compete with shrimp fishermen. There probably will always be more shrimp produced in the areas where fished than is possible on a shallow-water farm; and aquiculture is not feasible in the open ocean.

Use of Warmed Water?

The scientists may learn if the heated effluent from the Turkey Point plant can be used. The plant uses sea water to cool its condensors, both in the fuel oil and nuclear facilities. When the cooling water is pumped out, it can reach about 10° F. This heated water could benefit growing shrimp in the winter, when natural sea-water temperatures are low. This project may reveal if a nuclear plant pollutes Biscayne Bay.

Pompano Project

As the pompano project begins, the small pompano (1 to 2 inches long) will be caught in the surf along the upper East Coast of Florida. They will be raised in the Turkey Point ponds for about a year to reach marketable weight (about 1 pound). As more is learned about controlling the life cycle, the farming operations can be advanced to earlier stages. (Institute of Marine Sciences, U. of Miami, Feb. 22, 1968.)

Oregon

FISH COMMISSION SEEKS TO ESTABLISH ABALONE

Two hundred adult red abalone from California were planted at Whale Cove, north of

Newport in Lincoln County, reports the Oregon Fish Commission. They supplement over 5,000 juvenile abalone planted there in summer 1967 as part of the Commission's effort to establish the species along the north coast.

The adult shellfish were gathered from the Fort Bragg area south of Eureka. They measured 5 to 9 inches across the shell; the largest weighed up to 4 pounds.

Seventy-five selected adults were retained in tanks at Newport. They are being conditioned for spawning attempt under laboratory conditions. If the experiment succeeds, as expected, it will give the commission a ready source of juvenile abalone for further stocking.

It is not known whether water temperatures in the natural environment at Whale Cove will become high enough for successful natural spawning. In southern California, where the abalone is an important sport and commercial species, spawning occurs at 62 to 64 degrees Farenheit. Oregon's coastal waters seldom get this warm for any appreciable period.

Abalone Thriving in Whale Cove

The young abalone planted in Whale Cove in summer 1967 are doing extremely well, according to a Commission biologist. Most were planted when thumbnail size and have at least doubled in size. Whale Cove was selected as the first planting site on the north coast because brown algae, the primary item of the abalone diet, are abundant there. Also, limited access to the area and the interest of local residents and divers should protect the transplanted animals.

The red abalone occurs naturally on the coast of Coos and Curry Counties, as far north as Coos Bay.

Texas

EDA APPROVES FUNDS FOR BROWNSVILLE HARBOR EXPANSION

The Economic Development Administration (EDA) has approved $1,249,800 in grants and a $1,560,000 loan to help expand harbor and port facilities in the Brownsville area of Texas. The program is expected to create about 775 jobs in a 5-year period as the projects are built and begin operating.

The projects include the planned expansion of the fishing harbor. EDA approved a $720,000 grant for this. The applicant was the Brownsville Navigation District. A local investment of $480,000 will complete the total cost of $1,200,000. The project involves a new basin, improvement of docks and ramps, widening of a road, and installation of street lights, sewer lines, and a one-million gallon overhead water tank. The Navigation District estimated the project will increase the port's business by $30 million a year.

EDA is interested in increased capacity to process seafood products--and in the effect on the Gulf and overall market of increasing the supply of marketable seafoods.

* * *

FY 1966-67 LANDINGS

32.3 million pounds of fish worth $1.7 million were taken from Texas bays and the Gulf of Mexico during fiscal year 1966-67, according to the Texas Parks and Wildlife Department.

* * *

GALVESTON BAY YIELDS 6,000,000 POUNDS OF SEAFOOD

The total annual yield from Galveston Bay of commercial seafood products--such as shrimp, crabs, and fin fish--averages about 6,000,000 pounds. This was reported recently by J. R. Singleton, executive director of the Texas Parks and Wildlife Department.

A half-million pounds of oyster meat were taken from Galveston Bay in 1959. The figure increased to 4,000,000 pounds in 1966. (The 1967 season was still in progress.)

* * *

BIG FISH IN BAYS ATTRACT ILLEGAL NETTERS

The bays of Texas, especially Lower Laguna Madre, "are full of big fish," and this has produced an increase in illegal netting. So stated Tom D. Moore, regional director of the Texas Parks and Wildlife Department, in mid-March.

Low-flying Department pilots reported seeing more big fish in the shallow waters of the Lower Laguna Madre, near Port Isabel and Port Mansfield, than ever before. Sportsfishermen and trotliners have been very successful, and illegal netters have got into the act.

Hurricane Beulah The Cause

The increase in numbers and size of fish in the bays commonly follows hurricanes, explains E. G. Simmons, the Department's regional coastal fisheries supervisor. He believes Hurricane Beulah in September 1967 was even more productive than most storms.

Since Beulah, more than 50,000 feet of illegal nets have been confiscated in Laguna Madre. "Many fishermen had been arrested and convictions obtained."

North Carolina

1967 LANDINGS DOWN 10.5%

BCF figures show total North Carolina landings of shellfish and finfish for 1967 were 219,588,328 pounds worth $8,385,149. This was a 10.5 percent drop in weight and 12.1% decline in value from 1966 totals.

In 1966, total landings were 245,484,687 pounds worth $9,543,757.

The menhaden catch dropped most in 1967: 31,741,327 pounds fewer than 1966's 182,288,821 pounds.

Alaska

SCALLOPS: TO SHUCK OR NOT TO SHUCK ~ AT SEA

BCF Juneau reports that "aside from all of the recent excitement about 40,000-pound trips, 1,000 pounds per hour drags, and high $1.30 per pound product price, the paramount problem with Alaska scallops is to catch, process and market them at a profit."

The fishing industry and all others concerned are trying to decide between two alternatives: Should the Alaska scallop industry follow the method used by the East Coast scallop industry--shuck and freeze scallops aboard the vessel? Or, should Alaska scallops be landed alive and be shucked and processed in shore plants?

Fear East Coast Fishermen

Some Kodiak-based processors are thinking of legislation to require all portions of the scallops to be recovered by processors under the "wanton waste" clause. These processors fear that East Coast scallop vessels and fishermen will invade Alaskan waters, process the scallops on board, and market them in "stateside ports" without benefit to Alaskans.

BCF Juneau concludes: "Whatever the individual or community ideas may be, one fact remains: at present every pound of scallops processed is costing the processor money."

* * *

NEW SCALLOP FISHERY DEVELOPS RAPIDLY

The new scallop fishery in Kodiak, Alaska, is growing fast. It now has 4 vessels. Two others--the halibut schooner "Seattle" of Ballard, Wash., and the scallop dragger "Viking Queen" of New Bedford, Mass.--were expected to start fishing soon. The latter will test fish scallop beds in the Gulf of Alaska with U. S. aid.

Record Catch

On a 1-week trip, the Alaskan king crab vessel "Virginia Santos" landed a record 10,000 pounds of scallop meats. This equals 110,000 pounds comparative shell weight. The Santos made the first commercial landing of scallops on Jan. 10, 1968--35,000 pounds, shell weight. The yield of meats to shell weight has been 9-10 percent; exvessel price 7 cents per pound, shell weight.

Possible Alternative to King Crab

Observers believe that it has yet to be demonstrated that Alaskan scallops can be caught, processed, and marketed at a satisfactory profit. Scallops offer a possible alternative to king crab. The 1967 catch of king crab dropped 24 million pounds from 1966's record catch.

The decline in king crab catch also has renewed interest in developing the latent tanner crab resource.

* * *

MARINE SCIENCE COMPLEX PLANNED

Bills have been introduced into Alaska's House of Representatives and Senate for a $5 million bond issue to provide capital improvements for the "Trident Program." Conceived by Governor Hickel, the program would create a complex of marine research and educational facilities.

The program has 3 parts: the Alaska Institute for Fisheries Development, the Alaska Maritime Academy, and the Alaska Marine College, a sea-grant institution.

The Bond Issue

The sale of bonds would provide the money to pay part or all the cost of matching Federal and/or local funds that may become available to acquire, build, and equip the physical facilities.

California

BASKING SHARK FISHERY LAUNCHED

The basking shark fishery was launched Feb. 15 when 3 vessels caught six 25-foot sharks and a 15-foot juvenile at Morro Bay. This was reported by BCF Terminal Island, Calif. The average weight of the livers was about 1,000 pounds. The value of the livers depends on the amount of squalene in the oil.

The basking shark may reach 40 feet. It often can be seen at the surface basking in the sun and feeding on plankton.

Squalene is a hydrocarbon with very little nutritive value. When present in fish, it keeps away parasites. It gives a brilliant sheen to natural and artificial silks when used to finish them. Squalene also is used as lubricant, carrier of perfumes, and to fill thermometers.

Worth 20 Cents a Pound

At 35 percent squalene, the amount found in 3 sharks caught previously, the liver oil is worth 20 cents per pound. Oil samples were sent to prospective buyers in Japan and New York.

The fishery was expected to gain momentum in March when many basking sharks appear off the coast between Morro Bay and Santa Barbara.

* * *

INTEREST IN DRIED SEAWEED INCREASES

A sharp increase in the world price of dried seaweed has renewed interest in it in California, reports the State's Resources Agency. The seaweed is not macrocystis, which has been harvested in quantity for many years. It is gelidium, less than 2 feet tall; other small feathery forms also are being considered.

For about 20 years, 2 men have harvested and dried seaweed near Cambria; each produces about 10,000 pounds of dried material.

In southern California, the seaweeds can be found in many places. Commercial interests have scouted the harvestable areas. The Fish and Game Commission is preparing regulations for the orderly use of seaweeds. Harvesting may be allowed by summer 1968.

Permit to Harvest Kelp

The Commission issued a 1-year permit to the A. B. S. Fishing Co. to harvest kelp with herring eggs attached from Tomales Bay and San Francisco Bay. The product is prepared by salting and refrigeration. It is exported to Japan, where it is sold as a table delicacy for $3 a pound. So far, the company has harvested 9 tons.

Washington

HAKE FISHERY CUT AS MARKET DEMAND DROPS

Landings of Pacific hake during the 1967/68 fall-winter season in Puget Sound, through February, were about 2¾ million pounds. For the same period during the 1966/67 season, landings were 6 million pounds. The decreased landings can be explained largely by the reduced market demand for hake.

¾ of Landings at Everett

About 75 percent of the catch was landed at Everett, Wash., the remainder at Bellingham and La Conner, Wash.

If the hake fishery follows the pattern of 1965/66 and 1966/67, vessels will continue to fish hake in Puget Sound through May.

BUREAU OF COMMERCIAL FISHERIES PROGRAMS

'Oregon II' Tests Sonar and Longlines on First Cruise

BCF's new exploratory fishing vessel, Oregon II, has completed Cruise 1. During Sept. 6, 1967-Feb. 9, 1968, she conducted a series of 8 performance trial trips in the Gulf of Mexico. Five trips were concerned with testing sonar equipment, and three with testing experimental bottom and surface longline gear.

Fishing Gear

Bottom longline gear units consisted of 3 baskets of gear shackled together with a buoy and anchor attached to each end. One basket each of hook sizes 6, 7, and 9 (total 300 hooks) was fished at each station. A basket had 100 circle hooks on 6- to 12-inch monifilament gangions attached at 10-foot intervals to a $\frac{1}{4}$-inch nylon or polydactylene mainrope.

The swordfish longline gear used 5-fathom drops at each buoy. Buoys were placed 30 hooks apart; a small weight was placed every 15 hooks. Number 3 shark hooks on 2- to 3-fathom gangions were placed every 50 feet on the longline. The first set consisted of 210 hooks; later gear additions brought number of hooks per set to 530.

Results of Bottom Longlining

36,100 bottom longline hooks, baited with squid and ladyfish, were fished at 119 stations in 20 to 300 fathoms during 44 days of fishing.

The most abundant foodfish by number and weight was the Atlantic tilefish, (Lopholatilus chamaeleonticeps); 322 weighing 1,928 pounds were caught at 48 stations. It was thought that this species did not occur in potentially commercial concentrations in the Gulf--but it was taken from all major Gulf areas sampled during Cruise 1. Tilefish were taken in 100-200 fathoms, although major concentrations were in 150- to 200-fathom depth range. Maximum tilefish catches of 285, 166, and 104 pounds per 300 hooks were made off Texas, the Campeche Bank, and in the northern Gulf, respectively. Size ranged from 1 to 27 pounds in weight; average was 6 pounds. The gray tilefish (Caulolatilus microps) was found in smaller numbers from 100 to 150 fathoms along eastern edge of Campeche Bank.

The yellowedge grouper (Epinephelus flavolimbatus) was the second most abundant foodfish taken: 113 fish weighing 1,168 pounds were caught at 21 stations. The depth range was 75-150 fathoms; greatest abundance occurred at 100 fathoms. A catch of 271 pounds on a 300-hook set off Texas was the highest. A 105-pound catch from Campeche Bank was the highest from other Gulf areas. Yellowedge grouper were not taken from Florida, and only 2 were caught in northern Gulf. Average weight was 10.5 pounds; size range was 4 to about 20 pounds.

Other foodfish taken in small quantities were: red snapper, vermilion snapper, wenchman, scamp, porgies, hake, and warsaw, red, and black grouper. Shark was the largest single bottomfish component; 561 sharks weighed 2,642 pounds, or 32 percent of total bottomfish catch. The bulk of shark total was taken from northern Gulf area and comprised mostly dogfish (Squalus) and smoothhounds (Mustelus), averaging about 3 pounds.

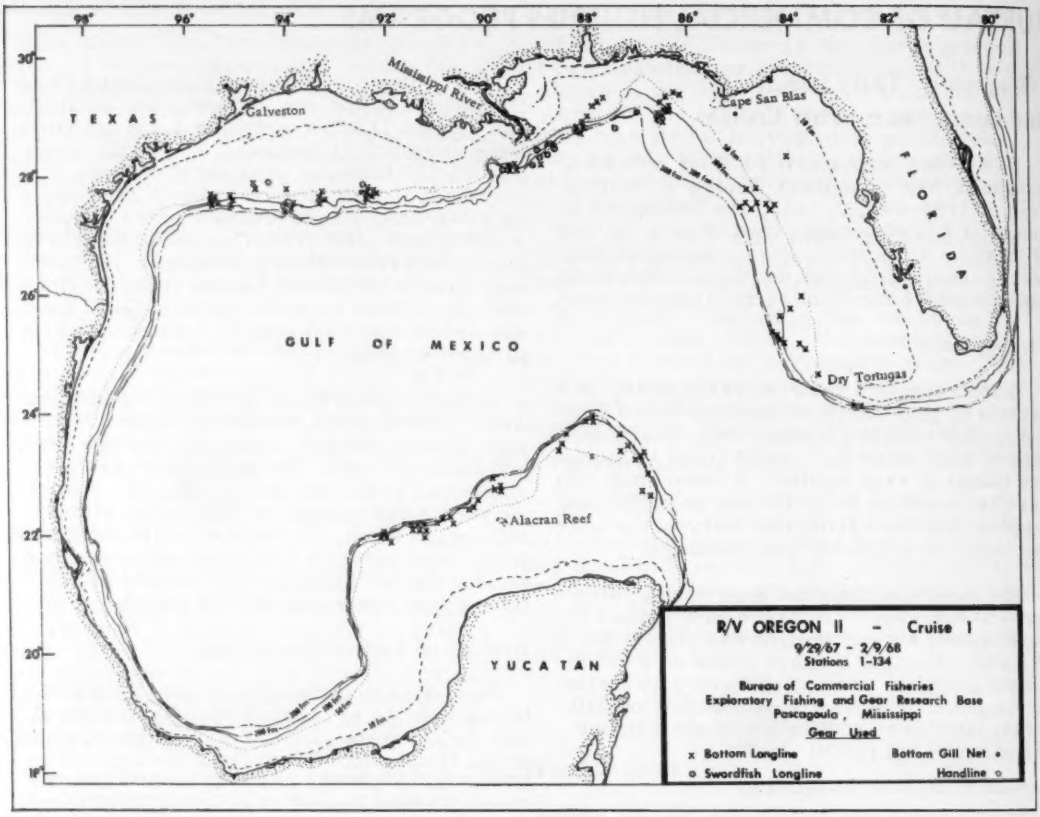
Results of Surface Longlining

Swordfish longline sets--8 sets (3,308 hooks) baited with $\frac{1}{2}$- to 1-pound Spanish mackerel and mullet were fished from DeSoto Canyon to the Mississippi River Delta (longitudes 87°03' to 89°41' W.) and in 210 to 400 fathoms. Twenty-seven swordfish weighing 3,048 pounds and ranging from 19 to 270 pounds (113 pounds average) were caught. Swordfish were taken at each station, but best fishing was off Mississippi River in 330 to 350 fathoms; there 3 sets (1,260 hooks) produced 21 fish weighing 1,543 pounds. Only 2 fish, weighing 305 pounds, were caught in DeSoto Canyon area (448 hooks).

Sharks were predominant fish taken on each longline set--75 percent of total catch; 93 sharks weighed 9,545 pounds. Hammerhead sharks were most abundant, but silky and dusky sharks were also caught in moderate numbers. Other sharks were mako, tiger, and bignose. One 70-pound white marlin was taken off Mississippi River Delta.

Sonar Used

Trips 1, 2, and 4 were in northern Gulf, and Trips 5 and 6 in eastern Gulf. During Trip 4, in October, numerous schools of surface



and subsurface herringlike fishes, including menhaden, were located by sonar in Cape San Blas-Cape St. George, Florida, area. Once, 105 surface schools were visually counted on surface within 5-mile radius of vessel. When sea surface became turbulent and schools sounded, they were detected by sonar in mid-water and near-bottom areas. Water depths ranged from 4 to 9 fathoms. Simultaneous aerial photographic and sonar detection were initiated during cruise.

Trips 5 and 6 concentrated in area from off Boca Grande to Fort Myers Beach, Florida, where commercial thread herring seiners were active. Minimum depth operational limitations of Oregon II (4 fathoms) restricted sonar operations in near-shore areas, where many commercial activities were centered. However, numerous large schools (over 50 tons) were detected in offshore areas. Thread herring concentrations were found as far as $8\frac{1}{2}$ miles offshore in depths to 7 fathoms.

Commercial vessels generally used aerial spotters. In some instances, water turbidity and lighting conditions were not favorable for reliable aerial detection--and sets were made solely on sonar information supplied by Oregon II. The value of sonar capabilities was clearly demonstrated to industry: the Oregon II returned to area in December after industry requested sonar assistance.

Coordinated Approach

Coordinated sonic fish-school measurements, aerial photography, and commercial vessel school samplings were made during November and December. Operational techniques and problems for this coordinated approach were studied and tested.

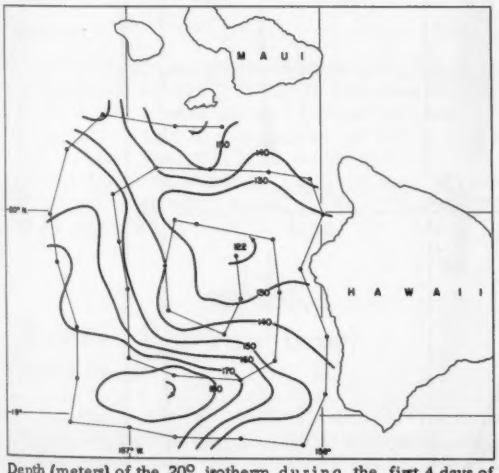
Additional coordinated resource assessment techniques are scheduled. Also planned during current fiscal year is design and development of a multisectional, narrow-beam, sonic device capable of making 2- or 3-dimensional measurements of pelagic fish schools. The long-range search and detection sonar is not suitable for these measurements, particularly in shallow water, because of its beam width (10°) and low frequency (20 KC).

During Trip 6, the sonar operation was demonstrated to industry members, 2 biologists from the St. Petersburg Biological Laboratory, and 3 members of another BCF program.

'Gilbert' Studies Thermocline West of Hawaii

The Charles H. Gilbert spent 4 days of its latest cruise determining the thermocline topography west of Hawaii (Cruise 107, Jan. 9-Feb. 24, 1968, Hawaii to Johnston Island).

Thirty-seven BT (bathythermograph) observations were made. Chart shows the thermocline topography measured.



Depth (meters) of the 20° isotherm during the first 4 days of Gilbert cruise 107.

Other Missions

The Gilbert had 2 other missions: (1) to determine the direction and speed of near-surface currents west of Hawaii and near Johnston Island, and the changes in current direction with time.

Thirty-four longline stations were occupied during the entire cruise. The drift of the longline gear during each station was used to determine the current.

The first 24 stations, off Kona, demonstrated the presence of a current flowing ESE toward the southern portions of the Kona Coast, and the presence of a cyclonic (counterclockwise) eddy in the northern half of the station pattern, as in chart. There is some indication of a 20-day periodicity in the speed and direction of flow south of the cyclonic eddy which might, upon further analysis, be evidence of periodic vortex shedding off South Point.

(2) To fish with longline gear, which is also used to determine currents. Also, to tag and release all tuna and billfish brought up alive and in good condition; the intent was to determine the changes in catch rate with time.

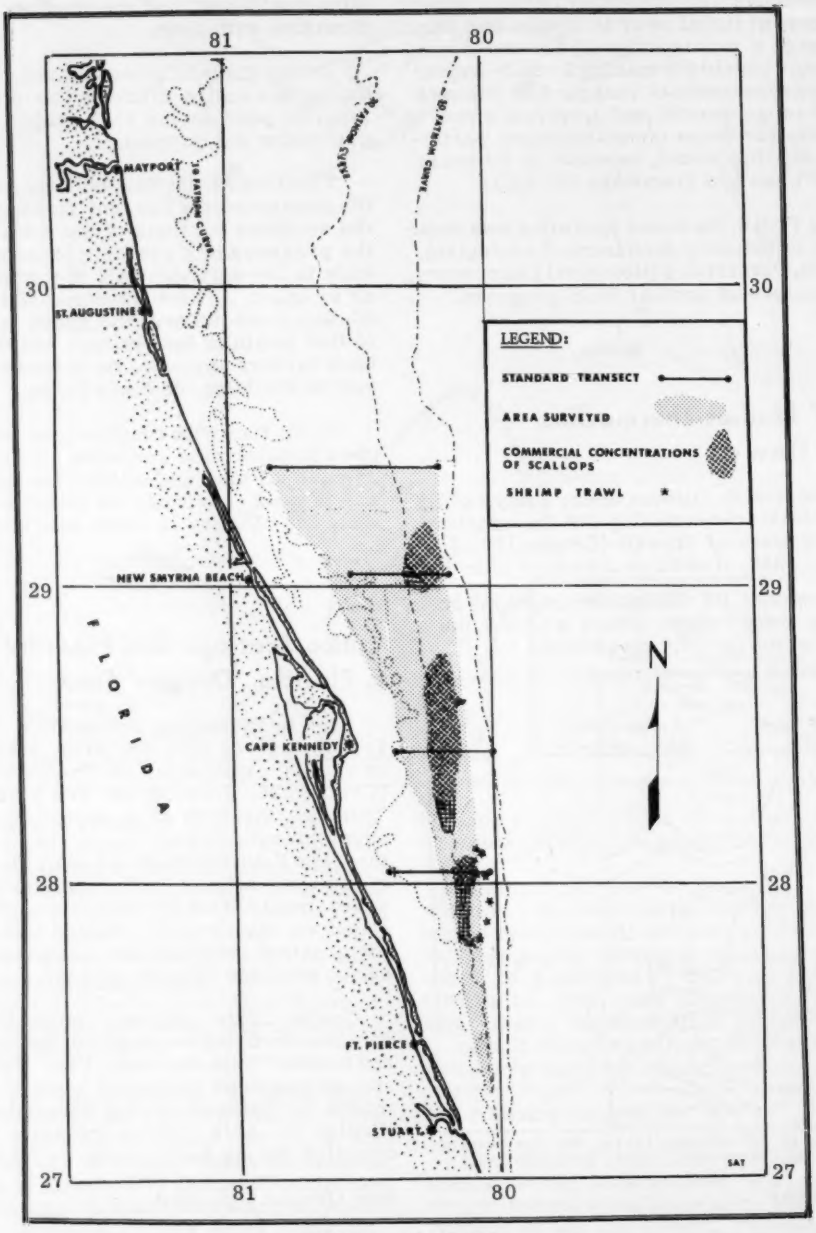
Calico Scallops Still Plentiful Off E. Florida, 'Oregon' Finds

The R/V Oregon returned to St. Simons Island, Ga., on Feb. 29, 1968, after 17 days of scallop exploration off Florida's east coast (Cruise 126, 2/12-29/68; see chart p. 20). This was the fifth in a series of industrial development cruises to resurvey intensively the Cape Kennedy scallop beds. The purpose of the explorations is to maintain up-to-date assessments of the Florida east coast grounds. Previous explorations showed them to have the greatest potential for commercial use of calico scallops (Pecten gibbus).

Cruise 126's primary objective was to continue dredging emphasizing the areas north and south of Cape Kennedy, Fla. Four standard assessment transects were run along tracts established during September 1967 (Cruise No. 121). These transects have been occupied during each cruise in the series.

How Oregon Operated

208 dredging stations were occupied in the 10- to 40-fathom depth range from east



R/V Oregon (Cruise 126).

of Jacksonville Beach to Stuart, Fla.; 197 stations were made with an 8-foot tumbler dredge fished with 2-inch bag rings, 20-rings deep; 11 stations were occupied with a 6-foot tumbler dredge fished with 2-inch bag rings, 13-rings deep. All dredges are fitted with 2½-inch-stretched mesh nylon liners.

The Findings

East of New Smyrna Beach, where commercial concentrations were located in September, catch rates remained commercially significant; these ranged up to 23.7 bushels of scallops per 30-minute drag in the 23- to 31-fathom range. Counts ranged from 55 to 103 meats per pound.

East of Cape Kennedy (between latitudes 28°30' N. and 29°00' N.) catch rates were again commercially significant--ranging up to 29 bushels of scallops per 30-minute drag. Counts ranged from 68 to 144 meats per pound.

In the survey area's southern portion, from 28°00' N. to east of Stuart, catches up to 14.9 bushels of scallops per 30-minute drag and counts of 143 meats per pound showed areas of commercial significance.

A 1-day dredging demonstration was conducted for observers. Fishing information was relayed to vessels engaged in the scallop fishery.

Shrimp

Nine nighttime stations were occupied east of Melbourne, Fla., in 22-30 fathoms with a 65-foot, 4-seam flat trawl fished with a single warp and bridle arrangement on 8-foot chain doors. Catches of 15/20 count (heads off) brown and pink shrimp (Penaeus aztecus and P. duorarum) were small. They ranged up to 10 pounds per 2-hour drag.

Modified Universal Trawl Tests Well

In early March, BCF's Seattle (Wash.) Exploratory Fishing and Gear Research Base cooperated with the commercial trawler "Junior" to demonstrate the effectiveness of a modified version of the Base-developed "universal" trawl.

The modified trawl is designed for midwater and ocean bottom use. It differs from earlier versions of the universal trawl used to harvest Pacific hake in having less webbing and larger mesh size in the wings--and so is easier to tow.

For 2 days, Junior fished alongside 3 other commercial trawlers and its catch was double any one of the 3. Six hauls by Junior caught 30,000 pounds of rockfish and 5,000 pounds of mixed flounders and Pacific cod.

Trawlers Plan To Use Trawl

Based on Junior's and similar earlier catches by BCF's "John N. Cobb," several captains of Pacific Northwest trawlers plan to build universal trawl nets from plans supplied by the Seattle Base.

Report on Pacific Saury

The Pacific saury (Cololabis saira) is a common fish in the waters off California and is known to extend across the temperate zone of the northern Pacific. This species eats copepods, euphausiids, and anchovy larvae. It competes with adult anchovy and mackerel for food--and is an important forage fish for temperate tunas. Japanese, Soviet, and Korean fisheries have competed for saury in the western Pacific for the last few years. Soviet exploratory vessels have delimited the major concentrations of Pacific saury in the last 3 years and have begun experimental fisheries in the eastern Pacific off Oregon and northern California. Major commercial uses for this species are as fresh fish, canned, smoked, and dried for human consumption and as the preferred long-line bait for the Japanese tuna fleet.

Million Metric Tons

We compiled data in January 1968 from past California Current fish egg and larval surveys to estimate the stock size of sauries which spawn in the 300,000-square-mile area. There appears to be a 9-year average of 264,000 metric tons of adult Pacific saury spawning in this area in March, April, May, and June. It is apparent from the distribution of spawning that we have encompassed the southern boundary of spawning rather well, but we have not defined either the offshore or northern extent of the saury spawning grounds. Scanty data along the edge of our survey area would indicate that the

264,000 metric ton estimate may only represent $\frac{1}{3}$ to $\frac{1}{4}$ of the saury stock in the eastern Pacific. Thus it now seems likely that nearly a million metric tons of Pacific saury exist in this part of the Pacific Ocean. (Paul E. Smith, BCF Fishery Biologist, La Jolla, Calif.)

Genetic Composition of South Pacific Skipjack Tuna Studied

The following was prepared by the BCF Biological Laboratory in Honolulu:

Kazuo Fujino, of our laboratory, spent 2 weeks fishing for tuna in Tahiti recently. His object was not food or sport, but to fill small plastic vials with blood drawn from the fish he caught. Dr. Fujino's specialty is the population genetics of marine animals, particularly the tunas, and blood samples afford the basic data he needs.

Tuna abound in Tahitian waters. Research cruises in the 1950s found many schools in the Society and nearby Marquesas Islands. The skipjack tuna (Katsuwonus pelamis) is particularly plentiful. It was the skipjack tuna that Dr. Fujino flew 2,500 miles to study, for one large gap in scientific knowledge of the skipjack tuna concerns the precise relation of these of the central South Pacific to those elsewhere.

Found in World's Warm Waters

Skipjack tunas are found in warm waters around the globe--in the Atlantic Ocean, the Indian Ocean, and the Pacific Ocean. Small but growing commercial fisheries exist in the Atlantic Ocean. Only a few of the fish are caught in the Indian Ocean at present. In the Pacific Ocean, the sea of tunas, in 1966, the Japanese took 224,000 metric tons (494 million pounds) in the waters near the home islands as far south as the Marianas. In the same year, the large U. S. fishery in the eastern Pacific caught 60,400 metric tons (133 million pounds) off Mexico and Central America. A third fishery, in the Hawaiian Islands, took 4.3 metric tons (9.4 million pounds). All these skipjack tuna were worth about $78 million to the fishermen.

And this large catch is far from reaching its peak, according to research of several scientific institutions, including ours. Scientists have estimated that the present yield of the central Pacific Ocean might be increased many times--with development of more effective methods of locating and taking the fish. Such an industry, based in Hawaii, would greatly strengthen the State's economy.

Problem of Conservation

Serious scientific problems attend bringing such a resource into production, however, and it was one of these that stimulated Dr. Fujino's trip to Tahiti.

History provides incontrovertible proof that man can wipe out wild species. The buffalo is a spectacular example; so is the largest of all living creatures, the blue whale. If the animal species of the sea are to be used wisely, they must not be harvested so heavily that they cannot reproduce themselves. In an elementary economy, the farmer saves seed grain, the rancher does not slaughter all his breeding animals; in the as yet primitive economy of the sea, which is based on hunting, a fishery might risk devastating a species, or all of a species in a certain area, if it is not carefully managed.

Therefore it is considered essential to understand the relation of the fishes in one area of the ocean to those in another. For example: Is there a single great skipjack tuna population in the Pacific Ocean? If catches were increased in the central Pacific, would enough of the stock be left elsewhere to replenish that area? Or are there several smaller populations, or subpopulations that do not interbreed?

Population Genetics Provides Leads

The discipline of population genetics provides some leads to answers; it depends upon the fact that certain characteristics are conveyed from one generation to the next, according to well-understood laws. In fishes, as in many other animals, some of these characteristics are blood types, and the presence of certain proteins in the serum.

Since it deals with populations, this branch of genetics requires many samples. The blood type of a single fish, or a few dozen fish, tells little or nothing about the whole population. But when hundreds of fish are sampled, then the population geneticist can draw conclusions about the population. The reason is that isolated subpopulations, groups

of fish that do not breed with fish from other groups, will display distinct proportions of blood types or other characteristics; these proportions change very, very slowly with the generations. So, in theory, if the fish from the eastern Pacific, say, never mingle with fish from off Japan to breed, then in time distinguishable subpopulations would be established.

In practical terms, this would also mean that if the population from off Japan, as an example, were brought to so low a level it could not reproduce itself, the area would not be repopulated by fish from the eastern Pacific--for they never would reach Japan. If, on the other hand, a single, great, freely intermingling population exists, the depletion of fish in any single area likely would be followed in time by replenishment.

Blood Center Established

To throw light on the subpopulation structure of the tunas, our laboratory has established a Tuna Blood Group Center. Samples come to it from all over the world. In recent months, shipments of skipjack tuna blood, for example, have been received from the Gulf of Guinea (off west Africa), and from the Trust Territory of the Pacific Islands in the western Pacific. And Dr. Fujino journeyed to Tahiti to obtain samples.

In all, 14,000 samples of tuna blood have been analyzed or are awaiting analysis at the Center. Because the species is important to the future of tuna fisheries in the central Pacific, more samples (12,000) of skipjack tuna blood have been taken than of any other species. But albacore are represented by 300 samples, bigeye tuna by 500 samples, yellowfin tuna by 700, southern bluefin tuna by 300 samples; there are others.

From this storehouse, Dr. Fujino has drawn the materials for a series of scientific papers for journals in this country and abroad. One of his papers outlines what is known of the subpopulation structure of the skipjack tuna in the Pacific Ocean. He reports that the skipjack tuna of the tropical western Pacific, those taken in the waters of the Trust Territory, belong to a subpopulation that does not appear in the Hawaiian fishery. Also different from the Hawaiian fish are those taken in Japanese coastal waters. Whether these differ from those of the Trust Territory is not yet known.

Questions Remain

There is some evidence that the skipjack tuna of the Hawaiian fishery may consist of representatives of more than one subpopulation, but the evidence is not yet clear. Nor is it entirely clear whether the skipjack tuna of Hawaii and those of the eastern Pacific come from a common population, or whether there is a population in one of the two areas that does not appear in the other area.

Dr. Fujino recommends that genetic studies throughout the Pacific be prosecuted more intensely--and that they be backed up by tagging fish in certain areas to determine what migratory patterns may exist.

Tag Offshore Lobsters

BCF and the Massachusetts Division of Marine Fisheries are conducting extensive tagging operations on offshore lobster grounds during April. The program began in March and will continue in June. The BCF research vessels "Albatross IV" and "Delaware" will be used during 3 cruises to catch, tag, and release 6,000 lobsters on the Continental Shelf fishing grounds.

This tagging study is part of the lobster research program of the BCF Biological Laboratory at Boothbay Harbor, Maine. The Exploratory Fishing and Gear Research Base at Gloucester, Mass., is cooperating while conducting exploratory fishing with deep-water lobster pots designed especially for the offshore fishing grounds.

The Tags

All lobsters are being tagged with back tags of bright-yellow vinyl plastic. The tags are coded and numbered to designate time and place of release. The commercial lobster fleet may expect to catch these tagged lobsters for several years because the tag is retained through successive moults. Lobstermen who catch the tagged lobsters will be paid the current landed value, plus a $1.00 reward for each lobster delivered to port with tag intact.

Information gathered will be used to determine migration patterns, growth rates and mortality rates of offshore stocks.

Ann Arbor Holds Training Seminar

A training seminar designed to exchange information and ideas between BCF and industry was held in Green Bay, Wisc., March 8-9. It was organized by BCF's Exploratory Fishing and Gear Research Base at Ann Arbor, Mich.

BCF personnel from biology, exploratory fishing, technology, marketing, and economics provided much useful information to fishermen and processors. Their subjects were: status of fish stocks and production, fish harvesting and handling procedures, processing and packaging, market expansion, and fishery economics.

State Representatives Attended

Personnel from the conservation departments of New York, Michigan, Wisconsin, and Pennsylvania also attended. They were particularly interested in fishing methods and equipment useful in controlling rough fish--and to investigate commercial fishing possibilities.

Miami Lab Has New Radio Station

A powerful new radio station became operational on March 11 at BCF's Tropical Atlantic Biological Laboratory (TABL) in Miami, Fla. The 1,000-watt, 4-frequency Coastal Station--call letters KAG--makes possible immediate voice contact between the lab and research vessels at sea. Theoretically, the station can reach ships by voice anywhere in the world. It has contacted regularly TABL's research vessel "Undaunted," which is investigating waters 6,000 miles away--off Angola, West Africa. The station will improve TABL's coordination and direction of its oceanographic activities.

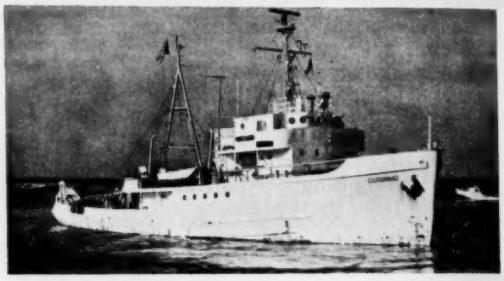
Other Agencies Can Use It

TABL will share the station with other oceanographic institutions in the Virginia Key area--with ESSA and the Institute of Marine Sciences. Both agencies often send ships to distant waters for long periods.

Before, with few exceptions, contact between oceanographic vessels on the high seas and their land bases was by written radiogram. Often, important communications were delayed for many hours. "Now scientific findings can be dictated by radio directly to a tape recorder at the home lab, transcribed within a few minutes, and placed under study the same day they were gathered aboard the research vessel."

'Geronimo' Is Taken Out of Service

BCF's research vessel Geronimo was laid up on March 8, 1968. Studies had shown that her research could be done more effectively and economically by BCF's "Undaunted" and by other vessels available in the Gulf of Mexico area.



The Geronimo was transferred from Washington, D. C., to the Gulf area in 1965 and based at Galveston, Texas.

In 1963, she worked with the communications satellite "Syncom II" to transmit oceanographic data. In 1964, she participated in the International Cooperative Investigation of the Tropical Atlantic.

The vessel, a converted tugboat built in 1944, is 143 feet long and displaces 760 tons.

BCF and Industry Promote Rainbow Trout

BCF and industry have been successful in introducing fresh rainbow trout to markets in the Cleveland, Ohio, area. In 3 days at the end of February, 1,200 pounds of the trout were flown in and sold through a supermarket chain. More orders were placed the next week. Akron, Ohio, is next on the trout-promotion list.

Cleveland is the latest inland area in which BCF has generated interest in air shipments of fishery products.

Safety Bulletins Issued on Explosives, Radar Use

BCF's Northeastern Region, Gloucester, Mass., has issued 2 important fishing vessel safety bulletins:

I. EXPLOSIVE ORDNANCE--WARNING TO FISHERMEN

All fishermen are warned of the danger of snagging explosive ordnance in their fishing gear. Explosives have been reported snagged in nets or dredges from the Gulf of Mexico to the Gulf of Maine. Most hazardous area is east of Cape Henry between 36-00 and 37-00 N. latitude and 74-40 and 75-00 W. longitude.

The U. S. Coast Guard advises all fishing vessel captains to regard any metallic object having fins, propeller or horns as dangerous. If in doubt about its identify--treat it as an explosive and do not attempt to bring it alongside or aboard. Release it and notify the nearest Coast Guard or Navy station--giving your position and description of the object.

If unable to release the object:

(1) Stream it aft as far as possible (2) keep crew forward away from stern of vessel (3) notify Coast Guard and stand by for instructions.

If a suspected explosive is not detected until brought on board:

(1) Lash securely in place immediately. (2) Keep it covered and wet down (3) avoid touching or jarring (4) notify Coast Guard or Navy immediately.

Locations of reported snagging by fishing vessels may be obtained from BCF--408 Atlantic Avenue, Boston, Mass. 02210.

II. RADAR AND WOODEN HULLS

BCF advises all fishing vessel operators that radar equipment should be used with a thorough understanding of its capabilities and limitations. One disadvantage of radar is its weakness in returning a picture from wooden objects. Only a small percentage of the 780 documented fishing vessels operating from New England ports is of steel construction--so your radar operations on the fishing grounds are confined almost entirely to wooden hulls. It is believed that fiberglass hulls react in like manner to radar waves.

The radar picture your vessel presents is directly proportional to the amount, location, and shape of metal surfaces on board. Request a radar check of your vessel from one of your fishing fleet companions. This should be carried out in clear weather at known distances. If your vessel does not register sharp and clear, then action should be taken to increase the radar visibility. Excellent methods of providing this extra protection and safety are: (1) Installation of radar targets on the mast head--similar to targets used by U. S. Coast Guard on navigational buoys; (2) increasing amount of metal surfaces on spars and pilot house.

ARTICLES

DETECTION OF FISH SCHOOLS BY SONAR (Eastern Tropical Pacific, July-November 1967)

By Robert I. McClendon*

In 1967 an investigation of the physical and biological oceanography of the eastern tropical Pacific was begun. This program, known as EASTROPAC, is intended to provide the necessary data for more effective use of marine resources of the area, especially tropical tunas. The investigation is coordinated by the Bureau of Commercial Fisheries (BCF) at its Fishery-Oceanography Center, La Jolla, California. Other United States Government agencies participating are the Coast Guard, Environmental Science Services Administration, The Naval Oceanographic Office, and the Smithsonian Institution. Other participants include the Scripps Institution of Oceanography of the University of California San Diego, Texas A&M University, and the University of Miami, Coral Gables, Florida. International cooperation is given by the Inter-American Tropical Tuna Commission at the Fishery-Oceanography Center, and its member nations--Chile, Ecuador, Mexico, and Peru.

The area from 20° N. to 20° S. and from the coast of South America to 126° W. is covered by multiple-ship (4 to 5 vessels) survey cruises. Single-vessel monitoring cruises are made bimonthly from 20° N. to 20° S. and from 98° W. to 119° W.

This report concerns occurrence of fish schools as determined from the sonar data collected aboard the BCF research vessel "David Starr Jordan" (fig. 1) on two EASTROPAC monitoring cruises during July 10 through November 27, 1967. Because data for Legs 1 and 2 for these two cruises were not available for comparison, only the information from Acapulco, Mexico, to the end of the cruise was used. The number of targets encountered on each cruise may be used as a measure of productivity and fish population in the area covered. A target is defined as any object in the open sea that appears on the sonar recorder. The presence of echoes was used as an indication of fish schools.

Fig. 1 - The Bureau's research vessel David Starr Jordan. (Photo: Herb Reynolds)

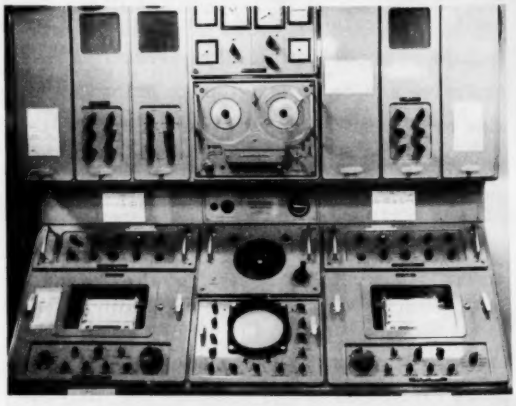


Fig. 2 - Operator's control and display console showing the 11 kHz unit on the right and the 30 kHz unit to the left.

The Simrad Research Sonar, Model 580-10[1/] (fig. 2), on the Jordan is designed for research. It is more versatile, more powerful, and has a much greater range than the sonar units on most fishing vessels. Although the complete

*Fishery Biologist, BCF Fishery-Oceanography Center, La Jolla, California.

1/Mention of firm does not imply endorsement by BCF.

U. S. DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Sep. No. 811

installation comprises two combination sonar/depth sounder sets operating at 11 kHz and 30 kHz (1 kHz equals 1,000 cycles per second), only the information from the 11 kHz set was used for this particular study. The 11 kHz transducer was aimed 10° off the starboard bow and set at a range of 2,500 meters. Thus, the sonar beam of approximately 23° covered a horizontal band about one-half nautical mile wide. As the ship moved through the water at an average speed of 10 knots, an area of about 5 square miles was searched each hour. In a day's running, an area of 75-85 square miles was sampled.

Unless identified otherwise, all targets included in this study were assumed to be fish, either single specimens or schools. Undoubtedly some debris floating in the water was encountered on both cruises. The number of these inanimate objects for cruise 30 was not available, but on cruise 50, during daylight, sight records of all surface objects were kept. Only two of nearly a thousand targets were disregarded when they were identified as driftwood. Because so few nonbiological targets were encountered during the day (0.02 percent of identified targets), I believe that they may be considered of no consequence in the data. Since the probability of nonbiological targets should be the same day or night, I assume that few of the nighttime targets on either cruise were flotsam.

Only a few fish schools other than flyingfish were sighted on the surface within the sonar beam; therefore the species composition of the schools recorded is not known. Skipjack tuna and "bait" (unidentified) were the only sightings. Whales and porpoises were sighted often from the ship but were recorded only twice. Although some porpoises and whales are frightened by sonar at certain frequencies, research to date has shown no reaction by fish at the sonar frequencies used (Miyaki 1952, Cushing and Richardson 1955). It is assumed, therefore, that fish in the area covered by this survey were not disturbed by the sonar.

The number of targets in 6-hour periods are shown on the track charts of the two cruises (figs. 3 and 4). The number of targets are estimates of total population along the track lines. The targets recorded for daylight hours were estimated from running time and expressed as targets per mile; the number of targets recorded for nighttime was adjusted for the day-night difference.

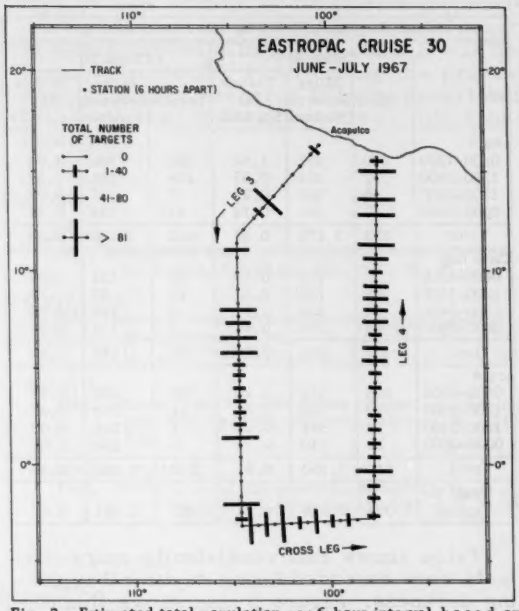


Fig. 3 - Estimated total population per 6-hour interval based on number of targets recorded on EASTROPAC cruise 30.

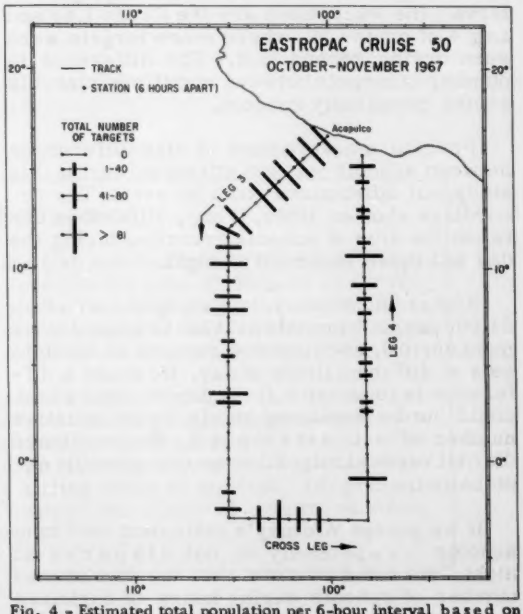


Fig. 4 - Estimated total population per 6-hour interval based on number of targets recorded on EASTROPAC cruise 50.

Total Targets Recorded by Time and Distance						
	Cruise 30			Cruise 50		
	Targets	Miles Between Stations	Targets Per Sq. Mile	Targets	Miles Between Stations	Targets Per Sq. Mile
Leg 3						
0600-1200	280	342	1.64	350	360	1.94
1200-1800	72	264	0.55	264	285	1.85
1800-2400	48	330	0.29	17	387	0.09
0000-0600	23	336	0.14	14	258	0.11
Total	423	1,272	0.67	645	1,290	0.98
Cross Leg						
0600-1200	27	104	0.52	65	124	1.05
1200-1800	96	104	1.85	24	63	.76
1800-2400	11	104	0.21	5	124	0.08
0000-0600	23	104	0.44	4	124	0.06
Total	157	416	0.75	98	435	0.45
Leg 4						
0600-1200	265	374	1.42	159	324	0.98
1200-1800	196	192	2.04	41	258	0.32
1800-2400	32	354	0.18	3	282	0.02
0000-0600	20	210	0.19	7	252	0.06
Total	513	1,130	0.91	210	1,116	0.38
Total for cruise	1,093	2,816	0.78	953	2,851	0.67

Table shows that consistently more contacts were recorded during daytime than during darkness. Figure 5 also shows this difference; further, it indicates a trend toward more targets in first half of the daylight interval; the exceptions are the Cross Leg and Leg 4 of cruise 30, where more targets were seen during second half. The difference in number of targets between nighttime intervals seems completely random.

Precise measurement of size differences between schools was not attempted during this study, but differences could be seen. The recordings showed little, if any, difference between the size of schools recorded during the day and those recorded at night.

Richard R. Whitney, in a study of more than 34,000 purse seine sets in 1954-62 (unpublished manuscript), used logbook records to tabulate sets at different times of day. He found a difference in tuna catch from day to night which could not be explained solely by the relative number of sets attempted. He mentioned diurnal vertical migration as one possible explanation.

If we accept Whitney's statement that tuna schools "... probably do not disperse at night," we can assume that the diminished number of schools during hours of darkness indicates a diurnal change in the depth at which schools are likely to be found. Diurnal vertical migration is well known in many species of schooling fish; it has been shown by changes in amount of catch by fishing gear as well as by direct studies (Woodhead 1964).

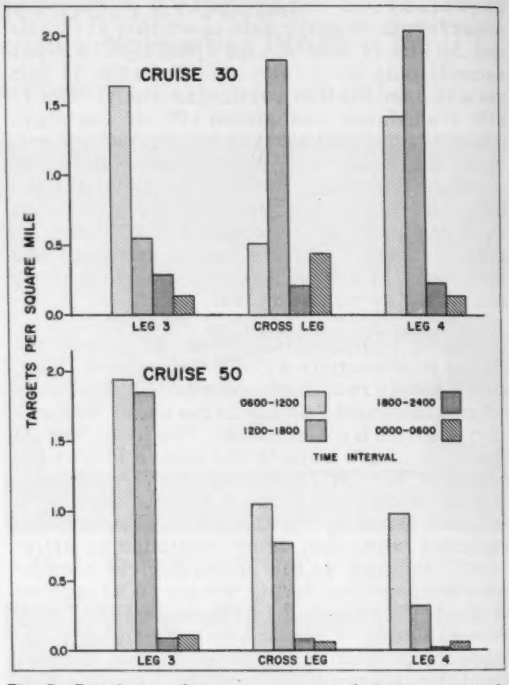


Fig. 5 - Distribution of targets per square mile by time interval for EASTROPAC cruises 30 and 50.

Aschoff (1964) stated that light is a common stimulus for change in behavior, and that it is probably more important in the marine environment than on land. He suggested that competition between species is reduced by differential rhythmicity of behavior. The difference in times that different species appear at the surface during the day also suggests that they may be at different depths during the night.

The sonar on these cruises was recording targets primarily above the thermocline (about 50-60 meters deep); fish schools would be less likely to be detected below this depth. That schools disperse during darkness has been suggested (Blaxter 1964). Others (Scofield 1951, Sette 1950, Shaw 1961) have stated that starlight, skylight, and bioluminescence may be sufficient to enable some species to maintain their schools.

This study has shown the usefulness of sonar in the estimation of total population over a wide area in a short time. Had we depended on surface sightings alone to estimate the fish population on these two cruises, we would have tabulated a different distribution and a different total number of schools. If the difference between sonar recordings and surface sightings of fish schools is considered (approximately 100:1 on cruise 50), the value of sonar in direct support of fishing is seen. It was not possible to identify fish during the present study; however, research is being undertaken that may make it possible to do so with sonar equipment.

LITERATURE CITED

ASCHOFF, J.
1963. Comparative physiology: Diurnal rhythms. Ann. Rev. Physiol. (25), pp. 81-600.

BLAXTER, J. H. S.
1964. Effect of change of light intensity on fish. Int. Comm. Northwest Atl. Fish. Environmental Symp., Rome 1964, Contr. No. F-2, 27 p.

CUSHING, D. H., AND I. D. RICHARDSON
1955. Echo sounding experiments on fish. Ministry of Agric. and Fish., Fishery Investigations, Ser. II, 18(4), pp. 1-34.

MIYAKI, I.
1952. Observations on sound production and response in tuna. Part IV of reaction of tunas and other fish to stimuli. U. S. Fish Wildl. Serv., Spec. Sci. Rep. Fish. 91, pp. 59-68.

SCOFIELD, W. L.
1951. Purse seines and other roundhaul nets in California. Calif. Dep. Fish Game, Fish. Bull. 81, 83 p.

SETTE, O. E.
1950. Biology of the Atlantic mackerel (Scomber scombrus) of North America. Part II - Migrations and habits. U. S. Fish Wildl. Serv., Fish. Bull. 51, pp. 251-358.

SHAW, E.
1961. Minimal light intensity and the dispersal of schooling fish. Bull. de l'Inst. Oceanogr., Monaco, No. 1213, 8 p.

WOODHEAD, P. M. J.
1964. The behavior of fish in relation to light in the sea. In Oceanography and Marine Biology, Vol. 4, H. Barnes (ed.), Hafner Publ. Co., N. Y., pp. 337-403.

SAVING FINGERLINGS

A system for transporting fingerling fish safely downstream past a dam or similar obstruction was patented recently by John P. Roscoe of Cutten, Calif. Roscoe's solution provides a bypass flow that gives the fingerlings a descent ladder at one side of the dam. It requires only a relatively small amount of power to operate.

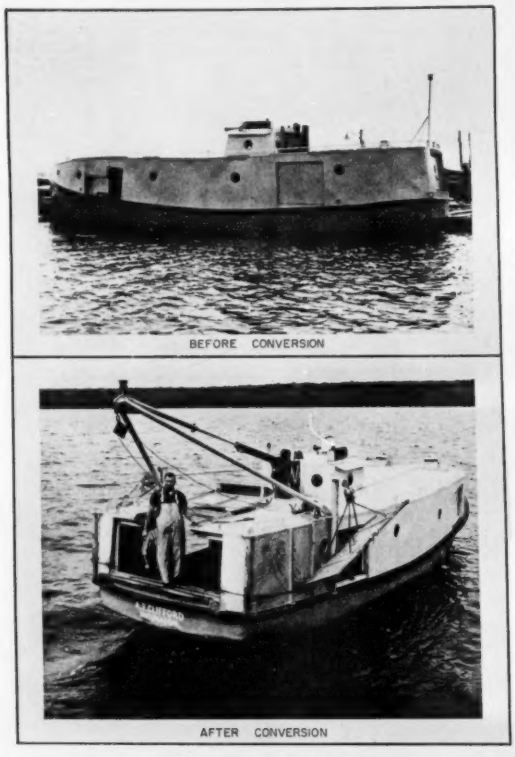
Although salmon and other fish can be transported upstream by fish ladders without difficulty, there is a problem in moving fingerlings downstream from spawning grounds especially when dams are of considerable height. The difficulty is that fingerlings tend to follow flowing currents. Such currents often pass through power turbines thus killing many of the fish. (Reprinted, with permission from "Science News," weekly summary of current science, copyright 1966, by Science Service, Inc.)

HOW LAKE SUPERIOR GILL NET VESSEL WAS CONVERTED TO TRAWLER

By Warren Handwork*

In Lake Michigan and Lake Erie, trawling is an efficient method for catching some species of commercial fish--smelt, chubs, and alewife. Vessels now used for trawling in the Great Lakes are mostly converted gill net vessels. (Gordon and Brouillard (1961) and Gordon (1962) described conversion methods.)

Experimental trawling was one part of an Economic Development Administration-Technical Assistance Project by the Bureau of Commercial Fisheries to help the commercial fishing industry of Lake Superior. Under this project, two gill net vessels were modified into trawlers to determine the feasibility of trawling for smelt, small chubs, and other underutilized species. This paper reports on the conversion of the "A. E. Clifford," a 45-foot, steel, gill net vessel operating out of Ontonagon, Michigan (fig. 1).



BEFORE CONVERSION

AFTER CONVERSION

Fig. 1 - The A. E. Clifford.

VESSEL CONVERSION

The A. E. Clifford was converted into a trawler in June 1966. The conversion features a minimum of structural alterations--but allows the vessel to function either as a stern trawler or a gill netter. No portion of the superstructure was removed, so the vessel retains the enclosed deck. The only structural modification was the installation of a hinged hatch cover for an opening cut in the top deck at the stern. The 4-foot square opening facilitates hoisting trawl catches aboard (figs. 2 and 3). Trawling equipment installed on the main deck in no way interferes with gill netting.

The A. E. Clifford's principal dimensions are: length overall, 45 feet; beam, 12 feet 10 inches; and draft, 6 feet. The vessel has a 120-horsepower diesel engine, which drives a 42-inch diameter by 38-inch pitch propeller through a 2:1 reduction gear. The vessel's cruising speed is 10 miles per hour. A 5-kilowatt generator supplies alternating current to lights and an oil furnace. The main engine electrical system furnishes the 12-volt direct current that operates an automatic pilot and echo sounders.

DECK EQUIPMENT

All deck equipment is powered hydraulically (figs. 4 and 5). A power-take-off unit from the main engine drives the two hydraulic pumps that provide independent power to each trawl winch. Each pump is rated at 17 input horsepower and pumps 17 gallons per minute at 900 revolutions per minute. Maximum working pressure of the hydraulic system is 1,500 pounds per square inch. Two single-spool directional valves operate the

*Fishery Methods and Equipment Specialist, BCF, Exploratory Fishing and Gear Research Base, Ann Arbor, Mich.

U. S. DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Sep. No. 812

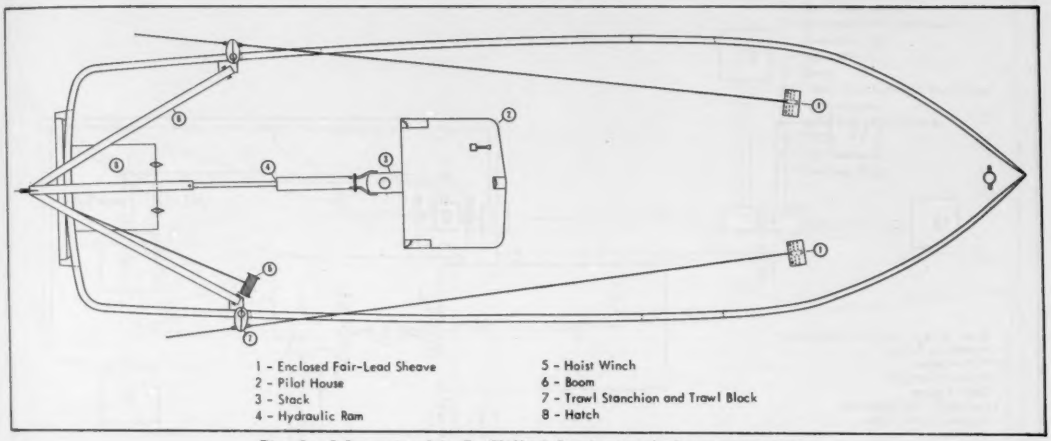

1 - Enclosed Fair-Lead Sheave
2 - Pilot House
3 - Stack
4 - Hydraulic Ram
5 - Hoist Winch
6 - Boom
7 - Trawl Stanchion and Trawl Block
8 - Hatch

Fig. 2 - Schematic of A. E. Clifford showing top deck arrangements.

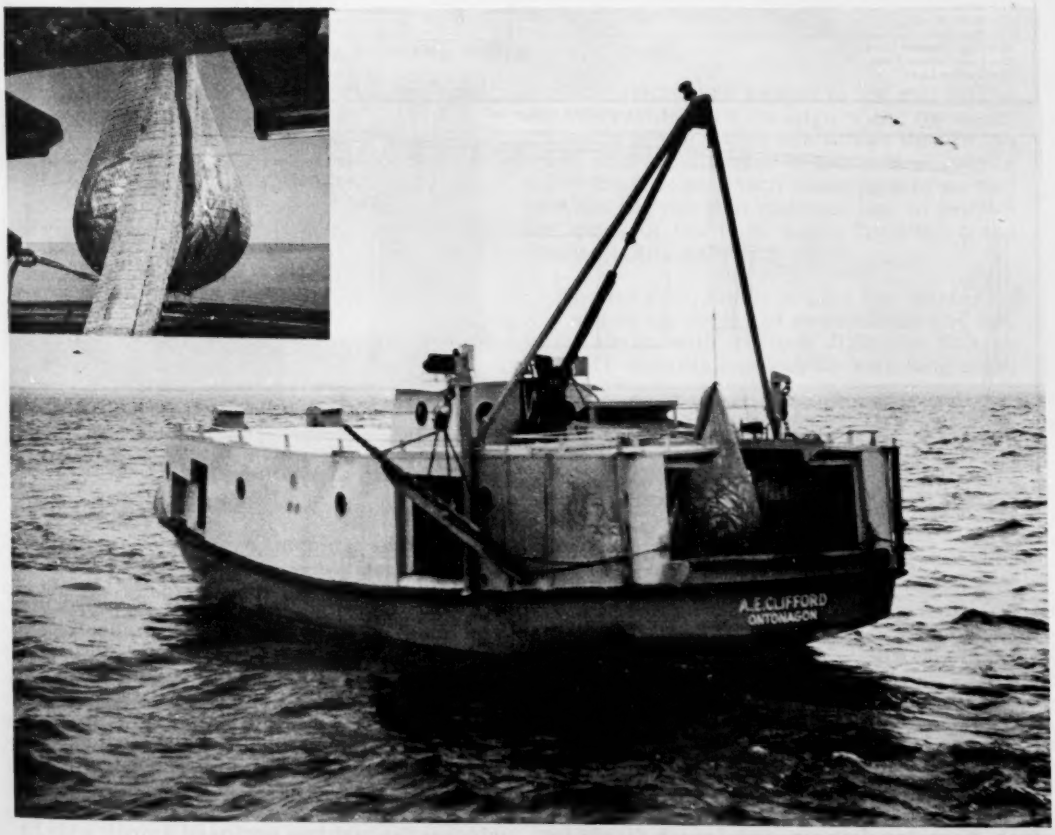


Fig. 3 - A 450-pound catch of chubs being brought aboard, August 1966.

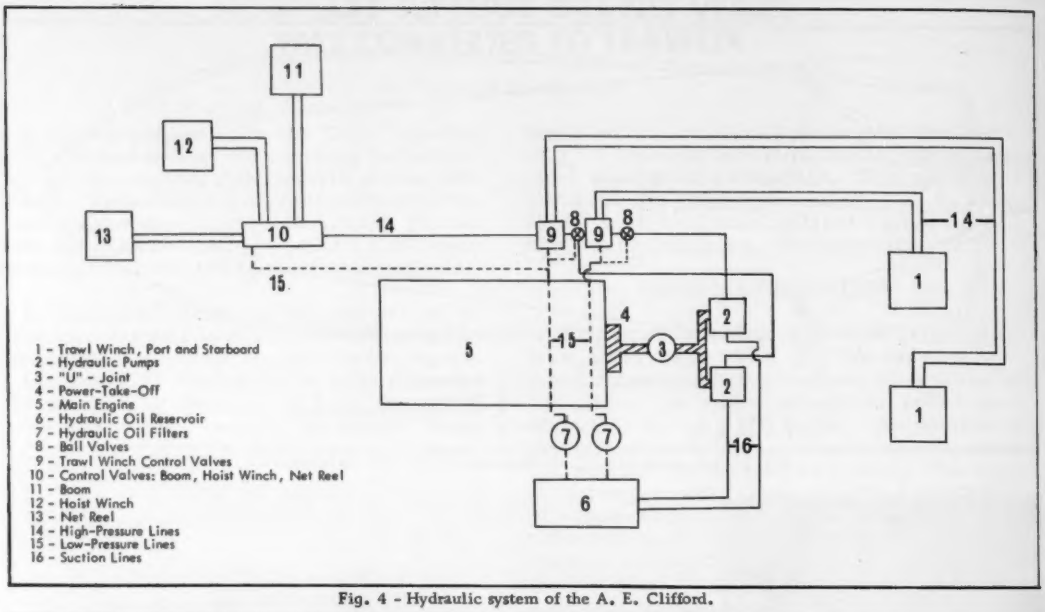


Fig. 4 - Hydraulic system of the A. E. Clifford.

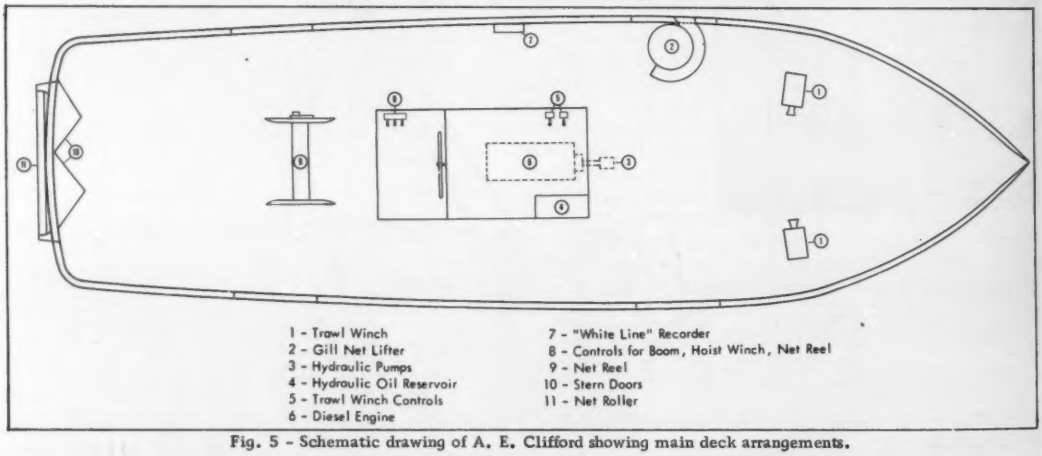

1 - Trawl Winch
2 - Gill Net Lifter
3 - Hydraulic Pumps
4 - Hydraulic Oil Reservoir
5 - Trawl Winch Controls
6 - Diesel Engine
7 - "White Line" Recorder
8 - Controls for Boom, Hoist Winch, Net Reel
9 - Net Reel
10 - Stern Doors
11 - Net Roller

Fig. 5 - Schematic drawing of A. E. Clifford showing main deck arrangements.

trawl winches; a 3-spool directional value operates the net reel, overhead boom, and hoist winch. The controls are accessible to the operator while he watches the trawling operation.

Two single-drum winches are located forward, port and starboard, to afford more working-deck space at the stern (figs. 4, 5, 6, 7). Each drum is 13 inches wide with 20-inch diameter flanges and 6-inch diameter core. Its capacity is 2,000 feet of $\frac{3}{8}$-inch diameter wire rope. Overall dimensions of the winches are: 30 inches long, 36 inches wide, and 26 inches high. Each winch has line pull of about 3,000 pounds bare drum and 1,200 pounds full drum, and an average line speed of about 200 feet per minute. Each winch is equipped with an independent gypsy head and controls for the clutch and the brake. The trawl warps are routed upward from the winches through two enclosed 4-inch wide by

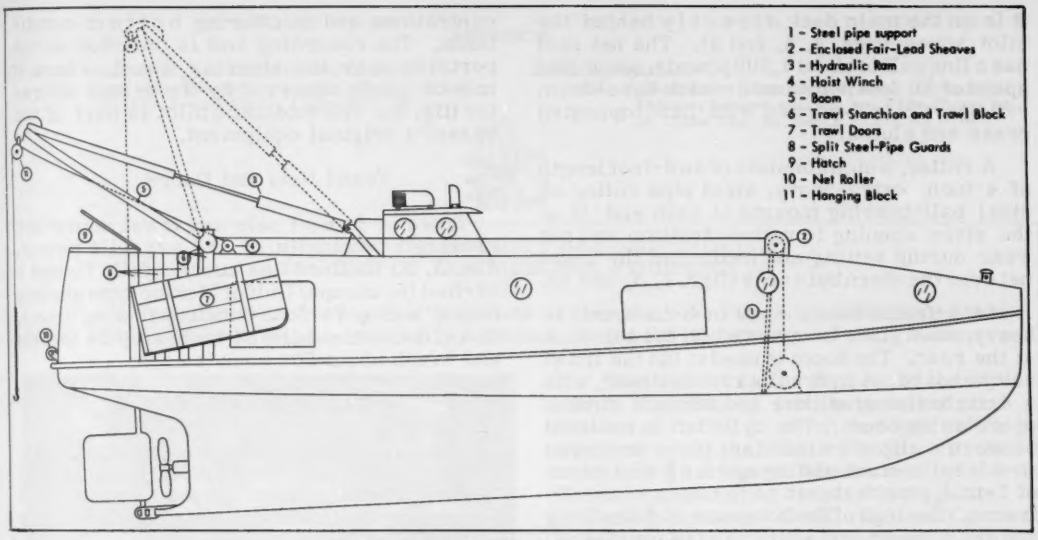

1 - Steel pipe support
2 - Enclosed Fair-Lead Sheaves
3 - Hydraulic Ram
4 - Hoist Winch
5 - Boom
6 - Trawl Stanchion and Trawl Block
7 - Trawl Doors
8 - Split Steel-Pipe Guards
9 - Hatch
10 - Net Roller
11 - Hanging Block

Fig. 6 - Outboard profile of the A. E. Clifford.

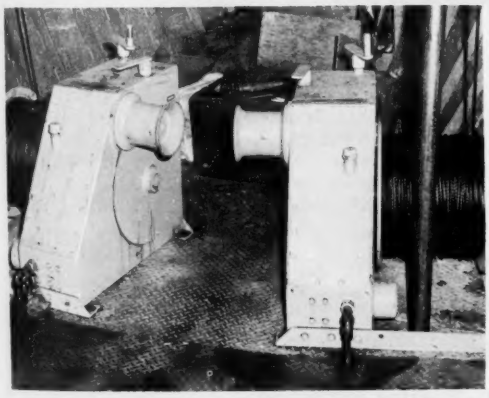


Fig. 7 - Hydraulic winches used in trawling.

8-inch diameter sheaves, mounted on the top deck directly above the winches (figs. 1, 2, 3, and 6). The sheaves move freely on a $1\frac{1}{2}$-inch diameter by 13-inch long horizontal steel shaft to provide unassisted level winding of the trawl warps during hauling. A 2-inch, extra-heavy, steel pipe is mounted vertically from the main deck to each base of the sheave housing for support (fig. 6). The warps then lead aft where they pass through two 4-inch wide by 8-inch diameter trawl blocks hanging from 4-inch diameter, extra-heavy, steel pipe stanchions located at the stern. The 6-foot stanchions are welded to the rub rail at the bottom and to the edge of the top deck. The ends of the warps are attached to the trawl doors. A series of half-round guards made from split 3-inch steel pipe is welded between the rub rail and roof line to protect the sides of the deck house from the trawl doors (figs. 1 and 6).

The net reel, which is used for retrieving and storing the trawl sweep lines and net, has a drum with 41-inch diameter flanges and a 10-inch diameter by 50-inch long core.

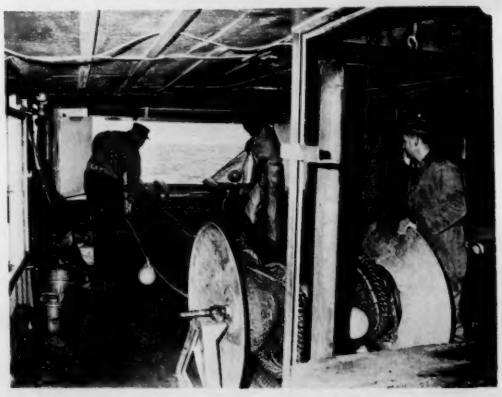


Fig. 8 - Hydraulic powered net reel used to retrieve and store trawl net.

It is on the main deck directly behind the pilot house (figs. 4, 5, and 8). The net reel has a line pull of about 1,800 pounds, and a line speed of 30 feet per minute--both bare-drum ratings. It is equipped with hand-operated brake and clutch.

A roller, which consists of an 8-foot length of 4-inch, extra-heavy, steel pipe riding on steel ball-bearing mounts at each end, is at the stern opening to reduce friction and net wear during setting and hauling of the trawl net over the stern bulwarks (figs. 1, 3, and 5).

An A-frame boom, made of 3-inch, extra-heavy, steel pipe, is mounted on the top deck at the rear. The boom is used to lift the trawl catch aboard. A hydraulic ram cylinder, with a 4-inch diameter bore and 48-inch stroke, operates the boom. The cylinder is mounted between a clip of 1-inch steel plate anchored firmly to the stack plating and a $6\frac{1}{2}$-foot piece of 3-inch pipe fastened to the apex of the A-frame. The legs of the boom are $12\frac{1}{2}$ feet long and are hinge-mounted at the base on 12-inch square pieces of $\frac{1}{2}$-inch steel plate welded to the top deck. A 4,000-pound capacity hoist winch is mounted on the top deck adjacent to the base of the boom's starboard leg (figs. 1, 2, 3, 4, and 6). The winch contains 50 feet of $\frac{5}{16}$-inch diameter wire rope that passes through a 6-inch diameter block hanging from the apex of the boom.

Electronic Equipment

A recording echo sounder with fish-discriminating features having a 0- to 95-fathom depth range is used for detecting fish concentrations and monitoring bottom conditions. The recording unit is mounted on the portside near the steering wheel, where it may be easily observed by the vessel operator (fig. 9). The automatic pilot is part of the vessel's original equipment.

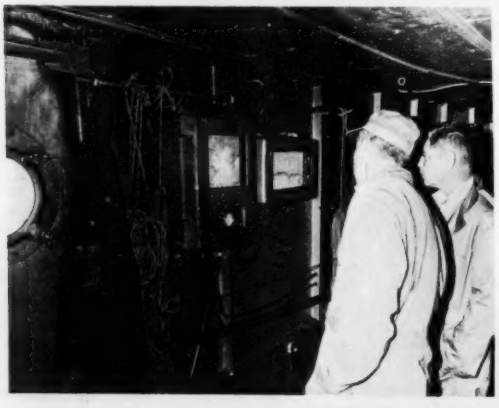


Fig. 9 - High resolution echo sounder with fish-discrimination features is unit right.

Trawl Nets and Doors

Sizes of trawl nets and trawl doors are governed primarily by the vessel's power. The A. E. Clifford has successfully fished a 52-foot (headrope) Gulf of Mexico type shrimp trawl, and a 70-foot (headrope) wing trawl. Trawl doors measure 84 inches by 39 inches and weigh about 300 pounds each.

Conversion Costs

The total cost of converting the A. E. Clifford to trawling was $9,700. Some of the labor performed by the vessel owners was not included in the labor costs. Following is a breakdown of costs:

Item	Cost in Dollars
A. Hydraulic equipment:	
Two single drum trawl winches	$2,880
One net reel	1,285
One hoist winch	200
One ram cylinder	150
Jack shaft assembly	340
Pumps, valves, reservoir, and filters	529
Lines and fittings	311
B. Electronic equipment:	
Recording echo sounder with fish-discriminating features	1,400
C. Fishing hardware:	
Blocks, wire rope, shackes, swivels, thimbles, etc.	600
D. Construction materials:	
Steel plate, pipe, angle iron, etc.	428
E. Fishing gear:	
One 52-foot (headrope) trawl	400
One pair of trawl doors, 7 feet by 39 inches	200
F. Labor:	
Welding	977
Total	$9,700

REFERENCES

GORDON, WILLIAM G., and KEITH D. BROUILLARD
1961. Great Lakes Trawler Conversion., U. S. Fish and Wildlife Service Fishery Leaflet 510, 15 pp.

GORDON, WILLIAM G.
1962. A Great Lakes Stern-Ramp Trawler. Commercial Fisheries Review, vol. 24, no. 4 (April) pp. 33-36. (Also Sep. No. 646.)

NORTH PACIFIC HALIBUT RECOMMENDED BY BUREAU OF COMMERCIAL FISHERIES

The Department of the Interior's Bureau of Commercial Fisheries (BCF) said that North Pacific halibut will be especially abundant during the late spring and early summer.

The halibut is the largest of the so-called "flatfishes," and the greatest proportion of the U. S. catch is found in the cold water of the North Pacific off the coasts of Washington, Alaska, and British Columbia, where the fishery is regulated by the International Pacific Halibut Commission. This Commission sets an annual quota in pounds which may be taken commercially. On the North Atlantic coast, where halibut is taken in much smaller amounts, there are no regulations as to seasons, size of catch, or fishing areas, so some landings are made throughout the year.

BCF Director H. E. Crowther, a member of the Halibut Commission, said commercial halibut range from 5 to more than 80 pounds, with a few as large as 400 pounds being landed. About 2 pounds of halibut steaks will provide average servings for six people.

The BCF test kitchens have developed several halibut recipes, among them this one for broiled halibut steaks:

BROILED HALIBUT STEAKS

2 pounds halibut steaks, fresh or frozen
2 tablespoons melted fat or oil
2 tablespoons lemon juice
1 teaspoon salt
½ teaspoon paprika
Dash pepper

Thaw frozen fish. Cut fish into 6 portions. Place fish in a single layer, on a well-greased baking pan, 15 by 10 by 1 inches. Combine remaining ingredients and mix well. Pour sauce over fish. Broil about 4 inches from source of heat for 10 to 15 minutes or until fish flake easily when tested with a fork. Baste once during broiling with sauce in pan. Makes 6 servings.

Additional halibut recipes are available in the BCF publication "How to Cook Halibut," available for 25¢ from the Superintendent of Documents, Government Printing Office, Washington, D. C. 20402.

INTERNATIONAL

U.S. and Mexico Agree on Fishery Zones

On Jan. 4, in El Paso, Texas, the International Boundary and Water Commission (U. S. and Mexico) outlined provisional boundaries between the exclusive fishery zones of the U. S. and Mexico in the Gulf of Mexico and the Pacific Ocean.

These boundaries were drawn to implement the U. S.-Mexico fishery agreement of Oct. 27, 1967. The 2 countries granted reciprocal privileges to fishermen to continue fishing between 9 and 12 nautical miles off each other's coasts for 5 years commencing Jan. 1, 1968. Both enacted legislation in 1966 reserving the right to fish within 12 miles of their coasts for their own citizens--except when fishing privileges are specifically granted to foreign fishermen by international agreements.

Gulf's Provisional Boundary

The provisional boundary for the Gulf of Mexico runs straight out to sea 12 nautical miles along the parallel of latitude passing through the middle of the Rio Grande's mouth. At present, this is the parallel of 25°57'15" N. latitude.

Pacific Boundary

In the Pacific Ocean, the provisional boundary is a "median line." This means that each point on it is equally distant from the nearest points on the baselines of both countries' territorial seas. For its first $5\frac{3}{4}$ nautical miles, the line prolongs the land boundary and runs from 32°32'03" N. latitude, 117°07'24" W. longitude, to 32°31'29" N. latitude, 117°14'10" W. It then turns approximately northwestward for $2\frac{1}{4}$ nautical miles to a point midway between Point Loma and the Coronado Islands, at 32°33'12" N. latitude, 117°15'51" W. longitude. From the latter point, it runs straight to 32°35'32" N. latitude, 117°27'46" W. longitude, which is 12 nautical miles from both Point Loma and the Coronado Islands.

Boundaries Now Effective

The provisional boundaries have been approved by both Governments and are now effective. (Dept. of State, Feb. 15, 1968.)

EEC Reports on Fisheries

Consumption of fish in the European Economic Community (EEC), the Common Market, for 1966 was 2.1 million metric tons; 80 percent was supplied by members' fisheries. If shellfish are included, the figure becomes 90 percent.

Because the EEC produces such a large portion of its own consumption of fishery products, protectionist tendencies may be strengthened in formulating its Common Fisheries Policy.

July 1 Target

EEC's Agriculture Committee recently urged that work on this policy be accelerated so that its provisions can be implemented as near the July 1 target date as possible. Efforts will be made to assure firm establishment of a Fisheries Policy prior to the admission to membership of other nations. (Regional Fisheries Attaché, U. S. Embassy, Copenhagen, Feb. 13, 1968.)

FAO Fishery Committee for Eastern Central Atlantic Being Organized

An FAO Fishery Committee for Eastern Central Atlantic is being organized following approval of its formation at the 48th Session of the FAO Council.

The following countries have joined: Congo (Kinshasa), Cameroon, Gambia, Greece, Italy, Ivory Coast, Japan, Korea, Poland, Senegal, Spain, Togo, and the United Kingdom. Thirteen other countries including the U. S. have not yet decided whether to join. (U. S. Embassy, Rome, Feb. 7, 1968.)

ICES Convention to Enter into Force

Italy has ratified the Convention for the International Council for the Exploration of the Sea. The Danish Government is informing all Contracting Parties that the new Convention

will enter into force on July 22, 1968. (Fisheries Attaché, U. S. Embassy, Copenhagen, Feb. 9, 1968.)

Japanese-Australian Shrimp Ventures Planned

Spurred by high prices, 3 major Japanese fishing firms are each planning to import shrimp from Australia under a develop-and-import formula. The trio--Nippon Suisan Kaisha, Taiyo Fishery Co., and Kyokuyo Hagei--recently applied to the Australian Government for permission to set up joint firms with Australian interests. Approval is expected because Australia reportedly supports the projects fully.

For 2 years, the 3 fishing firms had been test catching shrimp in the Gulf of Carpentaria and the Arafura Sea, off northern Australia. Shrimp resources are bountiful there.

The large, tasty shrimp have enjoyed good sales. They are called tiger and banana.

Tiger and Banana

In Japan, the tiger shrimp are sold wholesale between ¥1,300,000 and ¥1,400,000 (approx. $3,610-$3,880) per ton. This is US$1.64-1.76 a pound.

The banana shrimp sell for between ¥1,100,000 and ¥1,200,000 (about US$3,055-$3,333). This is US$1.39-1.51 a pound.

Those imported from the Soviet Union, Southeast Asia, and Mexico range between ¥900,000 and ¥1 million (approx. $2,500-$2,800 or US$1.10-1.27 a pound).

Joint Ventures

Nippon Suisan is planning to join with C. Itoh & Co. and set up Northern Research. This will be capitalized at A$1,000,000 (US$1.13 million) jointly with Hickman Distributors, a food maker.

Taiyo is planning to create North Australia Fisheries with William Angliss & Co., a food maker. Capital: A$300,000 (US$339,000).

Kyokuyo plans to form Gollin Kyokuyo Fishing Co., capitalized at A$100,000 (US$113,000), with Gollin Holding Ltd., a trading firm.

Each of the 3 Japanese firms will own more than half the shares of the projected companies.

Japanese fishing vessels and crewmen will be used during the first 5 years.

From the 6th year, the fishing vessels will be obtained locally at the Australian Government's request to help the local shipbuilding industry. Local labor also will man the vessels. ("Nihon Keizai Shimbun," Feb. 13, 1968.)

7 Weeks of World Baleen Whaling

The world baleen whale catch in Antarctic Ocean after 7 weeks (on Jan. 27) was 1,214 BWUs (blue-whale units), reports the International Whaling Commission Secretariat. That is about 300 BWUs fewer than the 1,527.4 BWUs reported for the 1966/67 period. However, the rate of kill is not bad because the present catch quota is 3,200 BWUs, while that for the previous, or 21st, season was 3,500 BWUs.

Japan Far Ahead

Catch by country as of Jan. 27 was: Norway (1 fleet) 128, the USSR (3 fleets) 372, and Japan (4 fleets) 714. However, the best season for Antarctic ocean whaling is normally between the 8th and 12th week. ("Suisan Tsushin," Feb. 9, 1968.)

Sweden Supplies FPC to Ethiopia

The Swedish International Development Agency has shipped 100 kilograms (220 pounds) of fish protein concentrate (FPC) to Ethiopia. It was the first FPC shipment under the Agency's aid program for Ethiopia. The product was developed a year ago by Asta Nutrition Co. of Sweden as a nutritional human food additive. The FPC will undergo a flavor acceptability test as a potential ingredient in

a children's diet supplement. It will be used under rigidly controlled conditions. ("Suisan Keizai Shimbun," Feb. 7, 1968, U. S. Embassy, Addis Ababa, Feb. 12, 1968.)

World Fish Meal Production in 1966 and 1967

	1967	1966
	. . . (Metric Tons) . . .	
Canada	89,434	88,344
Denmark	149,261	107,915
France	13,200	13,200
German Fed. Repub.	72,576	73,443
Sweden	7,824	6,189
United Kingdom	80,487	85,906
United States	167,154	175,586
Angola	2/ 24,118	54,670
Iceland	112,849	175,831
Norway	491,562	421,725
Peru	1,815,983	1,470,478
So. Afr. (including S.-W. Africa)	345,000	257,565
Belgium	1/3,780	4,500
Chile	130,866	194,221
Morocco	35,000	32,470
Spain	43,600	27,583
Total	3,582,694	3,189,626

1/Avg. monthly production in 1967: 315 tons.
2/Data available only for Jan.-July 1967.
Notes: Monthly data may not add to annual total because of revisions.

Japan does not report monthly fish meal production to the International Association of Fish Meal Manufacturers (IAFMM). Estimate for 1967 of fish meal and other animal meal (mostly fish meal) is 350,000 metric tons; 347,000 metric tons in 1966. (Foreign Agricultural Service, Tokyo, Nov. 15, 1967.)
Source: IAFMM.

FEO Exports in 1966 and 1967

Fish meal exports in 1967 reported by members of the Fish Meal Exporters Organization (FEO) show a 24-percent increase over 1966. FEO countries annually account for 90 percent of world exports. FEO members shipped 2.6 million metric tons in 1967, 2.1 million tons in 1966. Angola is excluded because comparable monthly data are not available.

Compared with 1966, Chilean exports in 1967 declined 40 percent and Icelandic 22 percent; Norwegian increased 85 percent, South African/South-West African 73 percent, and Peruvian 20 percent.

	1967	1966
	. (1,000 Metric Tons) .	
Chile	111.2	185.9
Angola	1/	53.6
Iceland	135.0	172.7
Norway	487.5	266.4
Peru	1,560.9	1,304.5
So. Africa (includ. S.-W. Africa)	286.0	165.6
Total	2/2,580.6	2,148.7

1/Not available (28,903 tons through Sept. 1967).
2/Excluding Angola.

Exports of fish meal from Angola through Sept. 1967 were down 22 percent from a year earlier (28,903 tons in 1967, 36,989 tons in 1966).

ICES Scheduled Meetings

The 56th meeting of the International Council for the Exploration of the Sea (ICES) will be held in Copenhagen, Sept. 30-Oct. 9, 1968. The meeting will be preceded by a Symposium on Biology of Early Stages and Recruitment Mechanisms of Herring, Sept. 26-28. (U. S. Embassy, Copenhagen, Feb. 16, 1968.)

FORTHCOMING ICES MEETINGS:

July 23-27--Symposium on "Marine Food-Chains." Organized with support of FAO, ICNAF, and UNESCO. Place: Aarhus, Jutland, Denmark, at Aarhus University.

Sept. 26-28--Symposium on "Biology of Early Stages and Recruitment Mechanisms of Herring" Copenhagen (Charlottenlund), Denmark.

Sept. 30-Oct. 9--The 56th Statutory Meeting of the Council, Copenhagen.

Sweden Will Aid Iran's Fishery Development

Sweden will help Iran develop her Persian Gulf fisheries by preparing a comprehensive plan to establish a modern fishery there. Iran will attempt to increase per-capita production of fish from present 1.1 lbs. to 11 lbs. within 10 years.

The fishing fleet will have 40 vessels and one mothership. More vessels will be added as fishery develops.

A training school is also to be constructed in southern Iran.

International Fisheries Reference

The "Fisheries Year Book and Directory 1967-68," published by the British-Continental Trade Press Ltd., is now available from the publisher (222 Strand, London) at US$5. This international reference and directory of the fishing and fish-processing industries is useful to those involved in the international trade of fishery products.

Names and addresses of firms in many countries are classified: (1) Producers, exporters, and trawler owners, (2) importers and wholesalers, (3) canners, (4) machinery and equipment, and (5) shipbuilders, supplies, transport, and packaging.

Also, there are several articles on developments in the fisheries of various nations in the last few years; processing developments; mechanical unloading of fresh fish; pumping fish from net to vessel; etc.

UN'S Caribbean Vessels Keep Busy

The 3 vessels connected with the UN/FAO Caribbean Fisheries Development Project were active in February. The "Alcyon" fished with hand lines on the Rosalind Bank, West of Jamaica, and on the margin of the Continental Shelf off Nicaragua and Honduras. About 12,000 pounds of fish, predominantly snapper, were landed at Kingston on Feb. 26. The vessel made a port call at Puerto Cabezas, Nicaragua.

The "Fregata" continued experimental fishing in the vicinity of the Netherlands Antilles, especially around Bonaire. Some success was reported in capturing flyingfish using drift gill nets and hand lines. Rough bottom conditions prevented plans to use bottom set lines. Experimental rafts that were set to attract fish disappeared before their effectiveness could be evaluated.

Port Calls

Port calls were made at Kralendijk, Bonaire, and Willemstad, Curacao. After "bilge keels" were added to the Fregata, she behaved better at sea.

The "Calamar"

The Calamar conducted exploratory trawling off French Guiana, Surinam, and Guyana. There was some gear damage off French Guiana, but good catches were made off Surinam and Guyana. Port calls were made at Cayenne and Georgetown, Guyana. At the latter port, the bulk of the catch was offloaded.

In Georgetown, the Calamar landed 22,874 lbs. of fish, of which 16,962 lbs. were sea trout. A small quantity was landed in Barbados when the vessel returned to home base.

Trawl Fish Landings

Commercial landings of trawl fish from the Guyana grounds are now made in Barbados. Up to the end of February, 4 trawlers had discharged their catches there. The fish are being purchased by the Barbados Marketing Corporation under a prearranged agreement. These landings resulted from the marketing demonstration carried out earlier by the Project through the Barbados Marketing Corporation using Calamar catches of trawl fish.

Breadth of Territorial Seas and Fishing Jurisdiction Claimed by Members of the United Nations

Country	Territorial Sea	Fishing Limits	Other
Albania	10 miles	12 miles	
Algeria	12 miles		
Argentina	200 miles		
Australia	3 miles		
Barbados			
Belgium	3 miles	12 miles[1/]	
Brazil	6 miles	12 miles	
Bulgaria	12 miles		
Burma	do		
Cambodia	5 miles	12 miles	Continental Shelf to 50 meters including sovereignty over superjacent (lying above or upon) waters.
Cameroun	18 miles		
Canada	3 miles	12 miles	
Ceylon	6 miles		Claims right to establish conservation zones within 100 nautical miles of the territorial sea.
Chile	50 kilometers	200 miles	
China	3 miles		
Colombia	6 miles	12 miles	
Congo (Brazzaville)			
Congo (Leopoldville)			
Costa Rica	3 miles		
Cuba	3 miles		
Cyprus	12 miles		
Dahomey	3 miles	12 miles	
Denmark	do	do[1/]	
Greenland		do	
Faroe Islands		do	
Dominican Republic	6 miles		6-mile contiguous zone including fishing.
Ecuador	200 miles		
El Salvador	200 miles		
Ethiopia	12 miles		
Federal Republic of Germany	3 miles	12 miles[1/]	
Finland	4 miles		
France	3 miles	12 miles	
Gabon	3 miles		
Gambia	3 miles		
Ghana	12 miles		Undefined protective areas may be proclaimed seaward of territorial sea, and up to 100 miles seaward of territorial sea may be proclaimed fishing conservation zone.
Greece	6 miles		
Guatemala	12 miles		
Guinea	130 miles		
Guyana			
Haiti	6 miles		
Honduras	12 miles		
Iceland	do	12 miles	
India	do	100 miles	
Indonesia	do		Archipelago theory.
Iran	do		
Iraq	do		
Ireland	3 miles	12 miles[1/]	
Israel	6 miles		
Italy	do	12 miles[1/]	
Ivory Coast	3 miles		
Jamaica	12 miles		
Japan	3 miles		
Jordan			
Kenya	3 miles		
Korea		20 to 200 miles	Continental Shelf including sovereignty over superjacent waters.
Kuwait	12 miles		
Lebanon		6 miles	
Liberia	12 miles		
Libya	do		
Malagasy Republic	do		
Malaysia	3 miles		
Maldive Islands		6 miles	
Malta	3 miles		
Mauritania	12 miles	12 miles	
Mexico	9 miles	do	
Morocco	3 miles	do	Exception--6 miles for Strait of Gibraltar.
Muscat and Oman			

(Listing continued on following page.)

Breadth of Territorial Seas and Fishing Jurisdiction Claimed by Members of the United Nations (Contd.)

Country	Territorial Sea	Fishing Limits	Other
Netherlands	3 miles	12 miles[1/]	
New Zealand	do	do	
Nicaragua	do	200 miles	Continental Shelf including sovereignty over superjacent waters.
Nigeria	12 miles		
Norway	4 miles	12 miles	
Pakistan	12 miles		Plus right to establish 100-mile conservation zones. Continental Shelf--including sovereignty over superjacent waters.
Panama	200 miles		
Peru	do	200 miles	
Philippines	Archipelago theory		Waters within straight lines joining appropriate points of outermost islands of the archipelago are considered internal waters; waters between these baselines and the limits described in the Treaty of Paris, Dec. 10, 1898, the United States-Spain Treaty of Nov. 7, 1900, and U. S.-U.K. Treaty of Jan. 2, 1930, are considered to be the territorial sea.
Poland	3 miles		
Portugal	6 miles	12 miles[1/]	
Romania	12 miles		
Saudi Arabia	12 miles		
Senegal	6 miles		
Sierra Leone	12 miles		
Singapore			
Somali Republic	6 miles		
South Africa	do	12 miles	
Spain	do	do[1/]	
Sudan	12 miles		
Sweden	4 miles	12 miles[1/]	
Syria	12 miles		Plus 6 miles necessary supervision zone.
Tanzania	do		
Thailand	do		
Togo	do		
Trinidad and Tobago	3 miles		
Tunisia	6 miles	12 miles	Territorial sea follows the 50-meter isobath for part of the coast (maximum 65 miles).
Turkey	6 miles	do	
Ukrainia S.S.R.	12 miles		
USSR	do		
United Arab Republic	do		
United Kingdom	3 miles	12 miles[1/]	
Colonies	do		
United States of America	do	12 miles	
Uruguay	6 miles	12 miles	
Venezuela	12 miles		
Vietnam		20 kilometers	
Yemen	12 miles		
Yugoslavia	10 miles		

1/Parties to the European Fisheries Convention which provides for the right to establish 3 miles exclusive fishing zone seaward of 3-mile territorial sea plus additional 6-mile fishing zone restricted to the convention nations.
Source: National Council on Marine Resources and Engineering Development, January 1, 1968.

FOREIGN

CANADA

BRITISH COLUMBIA FISHERMEN'S 1967 EARNINGS FELL

British Columbia (B. C.) fishermen and vessel owners earned C$49 million in 1967. While value of landings dropped sharply from C$60.6 million in banner year 1966, it was the fourth highest on record.

Salmon production of 133 million pounds was down 18 percent from 163 million pounds in 1966. Due to the larger percentage of higher-priced sockeye taken in 1967, the landed value of salmon was C$36 million, only 7 percent below 1966.

Landings of halibut by Canadian fishermen at B. C. and U. S. ports of 26.2 million pounds were 5.8 million pounds below 1966. Average exvessel prices dropped from 35.8 cents a pound in 1966 to 25.3 cents in 1967; total returns for halibut were C$6.6 million, compared with C$11.5 million in 1966.

Herring Landings Down 75%

Herring landings for 1967 were only 58,000 tons, or about one-quarter the average landings of the past 10 years. They were worth C$1.8 million--compared with C$5.1 million in 1966 and C$6.2 million in 1965.

There had been increased landings of bottomfish (other than halibut) for several years. These culminated in a 1966 catch of over 50 million pounds. But in 1967, production dropped sharply--to 37 million pounds. While part of this decrease was due to market conditions, production problems in the trawling fishery also contributed.

Grey cod production fell from 20.7 million pounds in 1966 to 11.1 million pounds in 1967. Sole landings dropped from 10.5 million to 9.1 million. Other landings, including ocean perch, declined from 14 million to 11.9 million pounds.

Ling Cod Landings Steady

Ling cod landings, including trawl and handline catches, totaled just under five million pounds worth C$462,000. Production has remained relatively constant over the past decade, although unit prices were down somewhat in 1967.

Crab, shrimp, and clam landings all were up in 1967; oyster shucking declined. The total landed value of shellfish reached a record C$2 million in 1967, 11 percent above 1966. ("Fisheries News," Canadian Department of Fisheries, Feb. 15, 1968.)

* * *

LICENSES LOBSTER FISHERMEN

Canada is licensing lobster fishermen in an attempt to limit fishing effort. This is in addition to a previously announced policy of limiting the number of traps. Boat owners will be required to pay a C$3 registration fee and $2 for a license; each helper will pay $1. Payment is to be made to the Department of Fisheries.

Moreover, vessels must also be registered with the Department of Transport. Registration will enable the Fisheries Department to maintain accurate records on vessels, gear, and employment in the lobster fishery. The new plan is part of an overall program for more efficient management of the fishery to increase earnings of the fishermen. (Canada Dept. of Fisheries, Feb. 6, 1968.)

* * *

FIRE DESTROYS NEW FISH MEAL PLANT

A new C$500,000 fish meal plant, scheduled to begin operations within 60 days on the former Harmon Field Base at Stephenville, Newfoundland, was destroyed by fire on Feb. 13, 1968. It is rumored that close to $100,000 worth of equipment was saved. The plant was built by a group combining the U. S. firms of Litton and W. R. Grace and financed by the Newfoundland Provincial Government.

Await Decision on Rebuilding

On Feb. 17, Premier Smallwood announced that if a decision is made to rebuild the plant, it can begin operating in 6 months. A Litton representative has already visited Newfoundland; one from W. R. Grace was expected. Presumably, a decision will follow that visit. (U. S. Consul, St. John's, Feb. 19, 1968.)

● ○ ○ ● ● ○ ○ ●

EUROPE

Norway

FISHING INDUSTRY FACES SEVERE CRISIS

Norway--world's fifth largest fish producer, second largest fish-meal producer, and major exporter to the U. S.--is undergoing what some Norwegians feel is the worst crisis since the 1930s. This despite record landings of 3.1 million metric tons in 1967. Prices, however, fell drastically.

Some industry problems are temporary: low prices domestically, and marketing difficulties abroad--loss of fresh-fish market in U. K. and stockfish market in Nigeria. Other problems are structural: overcapacity of purse-seine fleet and effects of devaluation.

The Government has begun programs to alleviate the most acute temporary problems. Industry difficulties have generated political pressure on Fisheries Minister Oddmund Myklebust.

Modern Fleet's Record Catch

The new catch record was achieved despite restrictions on purse-seine fisheries: herring, capelin, mackerel. These restrictions included stoppages and holidays brought on by 1967 world marketing conditions in fish meal and oil industry.

The production capacity of the modern purse-seine fleet far exceeds the processing capacity of the fish-meal industry. The purse-seiner building boom of 1965, 1966, and 1967 is ended. Only a few are now in order.

Government's Aid Program

Fisheries were the hardest hit export industry following devaluations. Also, the loss of the Nigerian stockfish market caused by political unrest caused inventories to grow alarmingly.

The Norwegian Government is proposing a US$850,000 subsidy to cover devaluation losses. It is extending a US$4 million interest-free loan to cover exporters' stockfish inventories. It has offered the Food and Agriculture Organization 7,000 more tons of stockfish for the World Food Program. And the Government may increase exvessel prices through increased subsidies. (U. S. Embassy, Oslo, Feb. 20, 1968; "Norwegian Fishing and Maritime News," vol. 14, 1967.)

* * *

DEVALUATION HURTS FISHING INDUSTRY MOST

Devaluation has hit the fishing industry hardest of all Norwegian industries. This occurred despite exports in 1967 of more fish and wildlife products than ever before.

Devaluation can be fatal to Norway's already failing exports of fresh fish to the United Kingdom (U.K.) The recent outbreak of hoof-and-mouth disease in the U. K. has improved the frozen fish market for Norway.

Exporters of cod have received no orders for stockfish from Nigeria since devaluation. The exporters say this resulted from the civil war there and from the more favorable situation of Iceland following devaluation.

Devaluation Affects Economy

Throughout Norwegian industry, some firms lost significantly on sales contracts signed before devaluation in devaluated currencies. Some firms have been able to increase prices to cover losses. Although competition and the price squeeze are generally intensified, conditions vary greatly from sector to sector.

Norwegian buyers have not received the advantage of cheaper imports. Many foreign firms in devaluing countries immediately notified Norwegian buyers of price increases on contracts signed in Norwegian kroner--and so took full advantage of devaluation.

Vessel Repair and Maintenance Hurt

Some English importers have ended old ties with Norwegian suppliers because the latter can no longer compete. Several Norwegian producers have not received a single foreign order since devaluation because the British and Danish can offer similar products at lower prices on the world market.

Norway (Contd.):

Norwegian vessel repair and maintenance yards have been hit particularly hard. As for new vessel construction, deliveries of large ships to foreign buyers remain at excellent level, while sales of fishing vessels have dropped.

Exports of large fishing vessels declined from 85 million Norwegian kroner in 1965 to 50 million kroner in 1966--then fell to only 23 million kroner in the first 10 months of 1967. (Regional Fisheries Attaché, U. S. Embassy, Copenhagen, Feb. 13.)

* * *

1967 EXPORTS OF FISHERY PRODUCTS

"Fiskets Gang" reported in January 1968 that Norwegian exports of frozen fillets in 1967 declined about 5 percent from 1966. Shipments of herring and haddock fillets declined significantly. Cod fillet exports were off only slightly at year's end.

Canned fish exports in 1967 were 27,430 metric tons, slightly below 1966 shipments. Exports of small sild sardines were up about 7 percent, but brisling shipments were down 20 percent. The main canning season for brisling and sild sardines begins in spring.

	Exports	
	1967	1966
	. . . (Metric Tons) . . .	
Frozen fillets:		
Haddock	10,966	14,602
Cod	25,583	26,056
Coalfish	19,565	17,828
Herring	6,689	8,435
Other	6,298	5,875
Total frozen fillets	69,101	72,796
Frozen herring	13,167	16,691
Canned fishery products:		
Brisling	5,963	7,539
Small sild sardines	13,463	12,637
Kippers	3,348	3,386
Shellfish	523	787
Other	4,133	4,539
Total canned fish	27,430	28,888
Fish meal	494,785	257,289
Herring oil, crude	165,721	80,841

Industrial Fish

Exports of fish meal in 1967 were up 92 percent from 1966. Norway maintained the status she gained in 1966 as the world's second largest producer of fish meal. Herring is the main species used for reduction, but mackerel and capelin are also very important.

* * *

NEW NORWEGIAN GROUP GRANTED EXPORT RIGHTS TO U. S.

Nordic Group A/L, the export organization for 11 (originally 14) frozen fish fillet producers established in fall 1967, has been granted export rights to the U. S. for one year by the Government. The export permit presupposes "positive cooperation" between Nordic and Norsk Frossenfisk A/L (Frionor) in exporting frozen fish fillets to the U. S.

Frionor Loses Monopoly

The Government's decision has been severely criticized in fisheries circles, particularly by Frionor. This group, naturally enough, wanted to retain exclusive export rights to the important and attractive U. S. market.

Nordic will start operations shortly from its Trondheim headquarters. The individual companies will be permitted to deal directly with their U. S. customers, but all exports will take place in the name of Nordic Group A/L. (U. S. Embassy, Oslo, Feb. 21, 1968.)

Denmark

1967 FISHERY EXPORTS SOARED BUT VALUE SAME AS 1966

In 1967, Denmark exported much larger quantities of fishery products than she did in 1966. But prices were lower and the total value of 885 million kroner (US$118 million) was virtually the same as in 1966. This was reported by the Ministry for Fisheries.

Exclusive of herring oil, 355,000 metric tons of fish products were exported in 1967 against 318,000 tons in 1966.

Herring oil exports nearly doubled: 62,000 tons in 1967--34,000 tons in 1966. These exports prevented the total 1967 export value from declining.

Denmark (Contd.):

Better prices in the U. S. for cod blocks were a favorable development during 1967; European prices for blocks also rose slightly.

Sales of Danish plaice in Europe fell in 1967 because of resistance to higher prices. Prices have now returned to more normal levels, and increased export sales are expected.

Denmark ranks fifth among world's fishery exporting nations by value and fourth by quantity, according to FAO data. (Asst. Regional Fisheries Attaché, U. S. Embassy, Copenhagen, March 1, 1968.)

* * *

INDUSTRIAL FISHERY IS EXCELLENT

Esbjerg's important industrial fishery started out in 1968 by breaking all records. February landings were expected to exceed 25,000 metric tons, three times those of Feb. 1967. Since Nov. 1967, more than 85,000 tons have been landed--compared with only 38,000 tons for the year-earlier period. Despite heavy supplies of fish, there are no plans to impose quotas on the cutters.

Esbjerg's 3 fish meal plants have been expanded within the last year (more expansion is planned). This permits the orderly processing of landings. The cool weather has also helped: the cutters can hold their loads up to 2 days without reducing quality appreciably.

Wait to Unload

Many cutters arriving in the harbor sit extremely low in the water because of heavy loads. Some even have net bags of fish hanging from the rigging. The ship inspection service has warned several skippers to follow the regulations on minimum freeboard.

Prices for industrial fish at the start of the season were up slightly from those at the end of 1967. Larger herring and sprat were bringing about 1.3 U. S. cents a lb. The heavy landings have now brought the price down to 1.2 U. S. cents a lb. for larger herring and sprat. Sea robins, Norway pout, and small herring and sprat are now bringing about 1.1 U. S. cents a lb.

Foreign Competition

The Esbjerg fish meal plants did well financially last year. They should do even better in the wake of last November's devaluation. The plants now pay less for raw material in relation to world price for fish meal. The Norwegians, who did not devalue, are said to be experiencing difficulties in marketing meal and oil.

However, the Danes are not rejoicing greatly over the excellent fishing now underway. They expect the Norwegians also to make heavy industrial catches and to continue effective competition. Also, they are acutely aware of large Peruvian fish meal stocks and of heavy catches there so far this year. (Asst. Regional Fisheries Attaché, U. S. Embassy, Copenhagen, March 1, 1968.)

* * *

FISHERMEN BUY CONTROL OF FISH MEAL PLANT

Several fishing skippers who have delivered catches of industrial fish to the privately owned West Jutland Herring Oil Industry (Vestjydsk Sildolie Industri) early this year urged the firm's director to enlarge the plant. About 50 other skippers are on waiting lists to deliver catches to the 3 large Esbjerg plants. The plants are reluctant to accept more raw material because of inadequate processing capacity.

Expansion to Result from Purchase

The Vestjydsk firm countered with an offer to sell controlling interest to the fishermen. Thirty-eight of the skippers now fishing for the firm decided to accept the offer. This involves the purchase of stock worth nearly $60,000 over a 3-year period. When payment is completed, more plant capacity costing about $200,000 will be built. Then the firm should be able to accept industrial fish from more vessels. (Asst. Regional Fisheries Attaché, U. S. Embassy, Copenhagen, March 1, 1968.)

* * *

FAROESE ORDER MORE FISHING VESSELS FROM NORWAY

A shipowner in Thorshavn, Faroe Islands, has ordered a 166-foot longliner from a

Denmark (Contd.):

shipyard in Ulsteinsvik, Norway. The new vessel will be the largest Faroese longliner. Equipped with a 1,200 hp. diesel motor, it will carry 27 men and have a hold capacity of 500 metric tons of salted fish and 100 tons of frozen fillets. The vessel will be a double-decker and permit the crew to work under shelter. The new vessel, to cost 5.2 million kroner (nearly US$700,000), will be delivered in December 1968.

9 Vessels on Order

Fishing vessels on order for Faroese owners are 3 stern trawlers, 2 longliners, and a purse seiner from Norwegian yards; one longliner and a purse seiner from Faroese yards; and one stern trawler from a West German yard. (Asst. Regional Fisheries Attaché, U. S. Embassy, Copenhagen, March 1, 1968.)

West Germany

FISHING INDUSTRY DECLINES SHARPLY

Early this year, the German Federal Republic coastal states of Bremen, Hamburg, Lower Saxony, and Schleswig-Holstein submitted a joint memorandum to the Federal Ministries for Food and Agriculture, Economics and Finance, and to the Bundestag (Parliament) asking financial support to correct critical developments in the fishing industry.

The states reported that the important trawler and lugger fisheries had lost DM7.9 million (4 DM = US$1) in 1965, DM37.5 million in 1966, and were continuing to decline in 1967. This decline was attributed to a drop in demand for fresh white fish of 12 percent in 1966 and 20 percent in 1967. The decline also affected frozen fish sales. As a result, white fish was diverted to fish-meal factories.

States Consider Fishing Essential

The coastal states consider the industry important to the total food supply and essential to Germany's economic policies. It is one mainstay of the states' economy. Though federal and state aid has improved the industry, marketing remains a critical problem; there are no prospects of a solution for the next several years. Therefore, the states believe increased federal aid is indispensable.

State Plans

The state governments propose to divert operations from white fish. They believe 25-30 trawlers and 20-25 luggers will have to be scrapped during the next 2-3 years. They are asking a scrapping premium subsidy of DM12.4 million from the government to prevent bankruptcy of fishing companies. A precedent for such premiums was established during 1961-1967.

The states also suggest that no funds from the revolving loans for vessel construction be granted for vessels designed to land white fish; that repayment terms of federal loans be extended for 2 years; and that federal aid be concentrated to improve marketing. (U. S. Consulate, Bremen, Feb. 23, 1968.)

Iceland

LIMITATIONS PUT ON HERRING FISHERY

The Icelandic Ministry of Fisheries announced on February 21, 1968, new limitations for 1968 on herring fishing off the south and west coasts. The new rules prohibited herring fishing from March 1 to August 15; limited maximum herring catch to 50,000 metric tons; and increased permissable minimum size of herring caught from 23 centimeters to 25 centimeters (almost 10 inches).

Conservation Measures

The purpose of the new measures is to conserve the south and west coast herring stock. Record catches were made during the mid-1960s. In recent years, many of the herring caught were "immature" fish, particularly during the summer. (U. S. Embassy, Reykjavik, Feb. 29, 1968.)

Spain

TUNA SEINER "SARASUA" TIED UP

The first trip of the Spanish stern-loading tuna purse seiner "SS Sarasua" was a failure.

Spain (Contd.):

It is attributed to the shipowners' lack of funds to carry out necessary operational changes and equipment adjustments.

The "Sarasua" is now laid up in Huelva awaiting creditors' decisions. (U. S. Consul, Bilbao, Feb. 29, 1968.)

Netherlands

REPORT ON 1967 FISH MEAL IMPORTS

	Metric Tons
Chile	18,333
Iceland	1,039
Norway	16,116
Peru	103,879
South Africa	1,675
Belgium	334
Denmark	3,483
Other	1,001
Total	145,880

United Kingdom

WHITE FISH AUTHORITY RAISES INTEREST RATES

The interest rates on fishery loans by the White Fish Authority, which became effective Nov. 20, 1967, are:

Loans for fishing vessels, new engines, nets, and gear for not more than 5 years--8 percent (an increase of $\frac{5}{8}$ percent).

More than 5 years but not over 10 years--8 percent (up $\frac{1}{2}$ percent).

More than 10 years but not over 15 years--8 percent (up $\frac{1}{2}$ percent).

More than 15 years but not over 20 years--$7\frac{7}{8}$ percent (up $\frac{3}{8}$ percent).

Loans to Processing Plants

Loans to processing plants for up to 15 years are $8\frac{3}{8}$ percent (an increase of $\frac{5}{8}$ percent).

Loans for over 15 years but less than 20 are $8\frac{1}{4}$ percent (up $\frac{1}{2}$ percent). ("Fishing News," Dec. 8, 1967.)

* * *

DEVELOPMENT PROGRAMS PLANNED

The British Whitefish Authority plans 2 development programs for the fishing industry. It will proceed with these programs with or without Government support.

The programs, which will be emphasized during 1968-69, aim to revive statutory minimum prices (floor prices) and to launch a large-scale campaign to increase fish consumption. The United Kingdom fishing industry had a poor year in 1967--prices, profits and indeaths. ("Fishing News," Mar. 1, 1968.)

Italy

CANNED TUNA PRODUCTION IS STILL RISING

Canned tuna production in Italy reached 40,000 metric tons in 1967, continuing the upward trend of recent years. The 1967 increase was caused by expanded production of canned tuna in oil to meet increased domestic demand.

Production of other canned fishery products remained unchanged from 1966: anchovies and sardines in oil, 2,500 tons; salted mackerel and anchovies, 2,700 tons; and other fish products 6,000 tons. Industry sources predict further increases in canned tuna output with minor increases in other canned fish products.

To Remain Net Importer

Although the outlook for the fishing industry is promising, and the fleet and shore facilities are being modernized, Italy is likely to remain a net importer of fishery products. Total consumption by 1970 is expected to be about 200,000 metric tons, with imports supplying 30 percent of the total. ("World Fishing," Feb. 1968.)

Belgium

FISHERY LANDINGS, 1961-67

"Fiskets Gang," published by the Norwegian Fishery Directorate, reports in the Jan. 20, 1968, issue these figures on Belgian landings 1961-67:

	Total Metric Tons
1967	51,648
1966	47,305
1965	48,073
1964	47,730
1963	51,678
1962	47,775
1961	46,372

Note: In 1967, total included 48,524 tons of bottomfish; 1,001 tons of pelagic fish; and 2,123 tons of shellfish.

Yugoslavia

AIDS CONGO

The state-owned Yugoslav firm "Energoprojekt" will construct 2 fish-processing plants equipped with deep-freezing equipment for the Government of the Republic of Congo. This is in addition to 2 electric power plants. Total aid will be over US$16 million. The cost of the fish-processing plants is not known. ("Tanjug," March 1, 1968.)

USSR

CONTINENTAL SHELF LAW PASSED

On Feb. 7, 1968, the decree of the Supreme Soviet establishing sovereign rights of the USSR to her territorial Continental Shelf was published. The USSR claims the shelf adjoining her territorial waters (12 miles) to the 200-meters depth. Violations are punishable with fines up to 10,000 rubles (US$11,100) and imprisonment up to 1 year. ("Vedomosti Verkhnogo Soveta SSR," Feb. 7, 1968.)

The new legislation incorporates provisions of the 1958 Geneva Convention on the Continental Shelf into the Soviet penal system. Soviet action comes 4 years after the U. S. passed its Public Law 88-308. The U. S. law prohibits foreign fishing in U. S. territorial waters and declares that the resources of the Continental Shelf belong to the United States.

Japanese Reaction to Soviet Action

The Japanese newspaper "Nihon Suisan Shimbun" stated on Feb. 21, 1968, that Japan has no international obligation to respect the Soviet announcement because Japan did not sign the 1958 Geneva Convention. However, Japanese fishery companies fear the Soviet proclamation may adversely affect their king crab fishery in the Sea of Okhotsk and tanner crab fishery off the Kamchatka Peninsula.

A few days later, both Foreign Ministry and Fisheries Agency officials reiterated Japan's position that king crabs are not sedentary creatures of the Continental Shelf, and so are not covered by the Soviet law. Also, Japan does not consider herself bound by the Soviet declaration of authority over minerals and sedentary marine creatures of the Continental Shelf off the Soviet coasts because Japan did not sign the 1958 Convention.

* * *

BUYS FROZEN FISH FROM BRITISH

A contract to supply frozen fish to the Soviet Union has been awarded British Limited, a frozen fish exporting cooperative of the Grimsby and Hull fishing ports. The value of the contract (£460,000 or US$1.1 million) is 50 percent greater than a similar one in 1967. The British hope other export orders may be obtained during the year. There was fierce competition from other European fish-exporting countries. ("World Fishing," Feb. 1968.)

The species of fish and quantities were not given. Traditionally, the Soviets buy frozen cod and herring, mostly from Iceland.

In 1966, the Soviets produced only 160,700 metric tons of frozen fishery products. Although this was considerably more than 1960's 57,400 tons, apparently it was not enough to satisfy rapidly expanding domestic demand.

* * *

USSR (Contd.):

RESEARCH IN
EQUATORIAL ATLANTIC ENDS

Two ATLANTNIRO fishery research vessels carried out exploratory studies in the Congo-Angola portion of the west African Continental Shelf and have returned to Kaliningrad. The expedition discovered new fishing grounds and determined that a snapper fishery could be profitably started. Soviet scientists estimate that up to 40 metric tons of snappers a day could be caught by large stern factory trawlers off Congo and Angola. Concentrations of large shrimp and squid also were discovered.

* * *

FISHING ATLAS PUBLISHED

The Polar Institute for Fisheries and Oceanography at Murmansk has published a Fishing Atlas of the White Sea containing 50 colored charts describing the effect of hydrological conditions on seasonal distribution of White Sea fish.

The Leningrad section of the Soviet Oceanographic Institute has drafted about 300 maps depicting hydrometerological and fishing data for the Caribbean Sea and the Gulf of Mexico.

MID EAST

Cyprus

PROSPECTS FOR A FISHING INDUSTRY

Despite Cyprus' natural geographic advantages, it must import 2,000 metric tons of fish every year. The local industry provides only 1,000 tons of fresh fish annually. The Government, trying to find substitute for imports, is more active now in promoting and expanding local production.

The meager production is attributable to several factors: lack of capital and training in the industry, overfishing, dynamiting, indiscriminate use of trawler nets, and possibly the deficiency of fish in coastal waters. However, recent studies showed many fish can be caught using proper measures.

Government Helps

In 1965, the Department of Fisheries in the Ministry of Agriculture and Natural Resources was established. This year, a Preventive Service was organized to curb unlawful fishing. The Government hopes to enact a new law this year regulating and policing the industry. US$120,000 is now available for loans to fishermen in inshore fishing to buy vessels, machinery, echo-sounders, and other devices required to develop the industry.

The Fisheries Department will conduct 1-month courses this year in maintenance of nautical machinery, making and repairing nets, and use of echo-sounders. It is now offering a 20-percent subsidy to buy echo-sounders. To encourage fishing in international waters, special subsidies will be given to trawlers that operate beyond Cyprus' inshore area.

FAO Helps

An FAO expert has been working with the Fisheries Department since September 1967 studying the feasibility of expanding pelagic fishing. The initial results are encouraging. Cyprus plans to buy its own research vessel this year to conduct biological and oceanographic investigations and to be a training center for fishermen. The Government is stocking, experimentally, 8 dams with freshwater fish. (U. S. Embassy, Nicosia, Feb. 28, 1968.)

LATIN AMERICA

Mexico

1967 CATCH ROSE 13 PERCENT ABOVE 1966's

Mexico's 1967 landings of fishery products were 233,274 metric tons--13 percent higher than 1966's 218,757 tons, according to preliminary figures. Several important food-fish species showed substantial gains. Shrimp continued to gain, and sardines and anchovies showed large gains. Nearly all sardines and anchovies are landed in Baja California and are canned as "sardines." The spiny lobster catch broke all records. Giant sea bass and grouper catches fell.

The output of industrial fishery products leveled off.

	1967	1966	Percentage + or - from 1966
	(1,000 Metric Tons)		
Edible fish & shellfish	197.5	171.5	+15
Shrimp	42.6	39.7	+ 7
Sardines	29.6	18.7	+58
Anchovy	22.8	13.7	+66
Lobster, spiny	1.6	1.4	+13
Mackerel	6.0	5.3	+14
Sea bass-grouper	4.6	7.7	-40
Oysters	19.7	19.9	- 1
Abalone	2.7	2.8	- 3
Fish meal production	10.2	9.6	+ 6
Kelp (landed)	20.1	22.1	- 9

Note: As landed or as first sold--heads on, heads off, dressed, round, shucked, dried, salted, or processed as in the case of fish meal.

Good Shrimp Year

The increase in shrimp catch, plus high prices during first-half 1967, resulted in a profitable year for exporters. Shrimp exports totaled US$64.1 million, up 22 percent from 1966. Shrimp maintained fourth place among all exports, led by corn, cotton, and sugar.

Most shrimp went to the U. S., but Japanese sources say 7,995 tons worth US$19.4 million went to Japan--through U. S. dealers.

Pacific Fishery Collapses

In Dec. 1967, the shrimp fishery collapsed on the Pacific Coast. Fishing was extremely poor in February 1968, and catches at the end of January were less than one percent the Jan. 1966 or 1967 level. However, catches have been holding up well on the Gulf coast.

* * *

NATIONALIZATION OF FISHING INDUSTRY

Commercial Fisheries Review reported in January 1968 that Mexico's National Bank for the Development of Cooperatives (BANFOCO) had bought in October 1967 the 8 fishery companies known collectively as Empresas Rodriguez. It became the largest producer of canned fish. The bank bought all shares owned by the Rodriguez family and privately held shares of company officials. All officers were retained on salaries, so the companies continue to operate effectively with no change in policy.

These are the companies:

Pesquera del Pacifico, S. A., at El Sauzal, about 5 miles from Ensenada. This plant is the largest individual cannery in Mexico. It has separate lines for tuna, sardines, mackerel, anchovies, tomato products, refried beans, peaches, fruit juice, and canned pet food. It also includes a large fish-meal plant that uses waste from fish-canning operations, plus whole anchovies. Nearly all products are for the domestic market.

Pesquera Peninsular, S. A., in Ensenada, cans sardines, mackerel, and anchovies. Recently it began to can sea mussels. Its fish meal and stickwater plant use waste from the cannery; it also receives offal from all independent canneries in Ensenada. All products are marketed in Mexico.

Pesquera Isla de Cedros, S. A., a cannery on the island of the same name. It packs anchovies, sardines, and mackerel for the domestic market; it cans abalone for export. It produces fish meal from cannery offal. The sale of this plant included 6 small purse-seine vessels: "Agustin II," "Captain Tsekus," "Portola," "San Martin," "San Rafael," and "Tito."

Pesquera de Bahia Tortugas, S. A., on the bay of that name in the Territory of Baja California Sur. It cans abalone for export.

Mexico (Contd.):

Pesquera Matancitas, S.A., a combination sardine cannery and fish-meal plant, on Bahia Magdalena in the Territory. It cans sardines and uses both cannery offal and whole fish to produce fish meal. It includes a largely unused freezing plant. The sale included 2 small purse-seine vessels: "Mexicano," and "Californiano." A third boat that fishes for matancitas ("moon beam") is privately owned.

Astilleros Rodriguez, S.A., the boat-building and repair yard in Ensenada.

Pesquero Santa Isabel, S.A., in Ensenada, operates the 3 tuna purse seiners supplying Pesquera del Pacifico (tonnage capacities in parentheses): "Santa Isabel" (220), "Tesoro del Mar" (200), and "Princesa" (175).

Atun Mex, S. de R. L., in Ensenada, formerly operated both the tuna and sardine fleets, but Santa Isabel was split off to handle the tuna vessels. Atun Mex now has only the sardine purse seiners that supply Pacifico and Peninsular. Several privately owned boats also deliver to these canneries. The 6 refrigerated vessels fish for sardines, anchovies, mackerel, and bonito--and for tuna during local runs. The vessels, with tonnage capacities in parentheses: "San Juan" (150), "Santa Maria" (135), "San Pedro" (120), "Stella Maris" (100), "Aida" (90), and "Marino II" (90).

All vessels in the 4 BANFOCO fleets were built in the U. S. They used to fish out of California ports. (Regional Fisheries Attaché, U. S. Embassy, Mexico, Mar. 3, 1968.)

* * *

1967 LANDINGS ROSE AT PILOT FISHING PORT OF ALVARADO

Although still operating far below capacity, landings and production at the pilot fishing port of Alvarado, Veracruz, have improved. Since it opened in 1964, the port has fallen short of expectations. The present management, however, is striving to increase landings and production, particularly by building large shrimp trawlers.

At the end of 1967, 15 vessels were operating from the port; 14 were under construction in local shipyards; 15 were being built in other shipyards. There were 240 persons employed ashore.

	1967		1966	
	Metric Tons	US$ 1,000	Metric Tons	US$ 1,000
Landings:				
Shrimp	273.0	457	225.5	309
Octopus	430.0	103	471.0	104
Finfish	2,081.0	170	1,446.0	170
Production:				
Fish meal	90.0	14	83.0	13
Canned fish	1/	282	1/	272

1/Not available.

* * *

JAPAN-MEXICO 12-MILE FISHING ZONE TALKS RESUME

The second round of talks between Japan and Mexico to permit Japanese fishing inside Mexico's 12-mile exclusive fishery zone opened in Tokyo, Japan, on Jan. 22, 1968. The Japanese outlook is that an agreement will be reached. ("Suisancho Nippo," Jan. 17, 1968.)

Peru

ANCHOVY FISHING SEASON REOPENS

Anchovy fishing in Peru recommenced on March 18, after a closed season ("veda") that began Feb. 17.

Fish-meal production during Jan. 1-Feb. 15 was 447,410 metric tons; shipments during same period were 285,007 metric tons.

Stocks on hand, as of Feb. 15, were 758,107 tons; 115 plants were in production. Mid-March stocks were estimated at 600,000 tons. (U. S. Embassy, Lima, March 19.)

* * *

FISH MEAL PRODUCTION AND HOLDINGS

Peruvian fish meal stocks on Jan. 31, 1968, were the highest ever; 1967 production also set a record.

	1968	1967	1966	1965
	(Metric Tons)			
Fish meal production:				
Total for year	-	1,815,983	1,470,478	1,282,011
January	287,466	242,380	194,104	164,899
Stocks held on Jan. 31	688,943	600,340	375,165	237,443

Source: "Sociedad Nacional de Pesquera," Feb. 21, 1968.

* * *

Peru (Contd.):

FISH-MEAL PRODUCERS APPEAL TO GOVERNMENT

The Association of Small and Medium Fish-Meal Producers has written the Ministry of Agriculture, which is responsible for fisheries, complaining that low fish-meal prices and lack of capital have forced many of its plants to close. The letter says that unless the situation improves, many plants will close for good.

Conveyor belt carrying anchovies into fish meal plant for processing. (Photo: M. J. Lindner)

Among the causes cited was Decree 77 of December 9, 1967; this prevents "free commercialization" of fish meal. The Association claims that the decree favors Peru's competitors: it creates an artificial saturation of the market and forces Peru to maintain enormous stocks of fish meal, which adversely affect prices.

What Association Asks

The Association asked that Decree 77 be modified to make the marketing machinery voluntary, not obligatory. The Ministry was asked also to enforce the anchoveta catch limit of 8 million metric tons, to speed paperwork involved in getting fish meal shipped, and to transfer the responsibility for recording fish-meal exports from the National Fisheries Society (SNP) to the Ministry. ("Pesca," Dec. 1967.)

* * *

CONSULTANTS RECOMMEND HAKE INDUSTRY TO GOVERNMENT

A Spanish consulting firm, "Techniberia," has recommended to the Peruvian Government that it set up a hake catching and distribution operation. The recommendation followed the firm's study of the fishing industry and fish resources.

Firm's Thoughts

Techniberia observed: (1) There is little chance of a dramatic increase in catch of currently desired species--mullet, sea bass, and others--because they are relative scarce; (2) Prospects for large-scale marketing of fish are more favorable for frozen than for fresh products; (3) Large-scale sales of frozen hake would not conflict with sales of fresh fish; and (4) It would be necessary to set up a complete new system for catching and marketing hake.

The group recommends trawlers 80-85 feet long, with a capacity of 50-60 tons, equipped to trawl at depths greater than now fished. It recommends also construction of freezing plants. The system could be operational within 18 months. ("Pesca," Dec. 1967.)

* * *

SHIPYARD BUILDS 6 LARGE PURSE SEINERS

The firm Maestranzas y Astilleros Delta, S.A., in Callao, is building 6 large purse seiners for Fabrica de Conservas Neptuno, a fish-meal plant in Chimbote.

The wood vessels are 95 feet long, can hold 350 tons, and will cost US$165,000.

The vessels were scheduled to be delivered in March ready to fish. Orders for similar vessels are pending from Pesquera Amazonas, Pesquera Trinidad, and Pesquera Taybe. ("Pesca," Dec. 1967.)

ASIA

Japan

FISHERIES DIRECTOR OUTLINES POSITIONS AND PLANS

On Feb. 13, 1968, the Director of the Japanese Fisheries Agency addressed a meeting of Chiefs of Fishery Departments (Prefectures). The following are highlights of his talk:

• Development of New Fishing Grounds: The Fisheries Agency will undertake a large-scale survey to develop new fishing grounds.

• Fishery Financing: To modernize the industry, the Agency will study the status of fishery financing and use of the Fishery Cooperative Associations' funds.

• Abolition of Fish Price Stabilization Fund: Since a bill to abolish the fund is due to be brought before the Diet, the Agency is studying other measures to stabilize prices.

• Partial Revision of Ships Safety Law: Ratification of the International Treaty on Full Draft of 1966 and a bill to partially revise the domestic Ships Safety Law--will be brought before the Diet. When revised, fishing vessels of more than 20 tons will have to identify their full draft line, and loading will be restricted. To prevent hardships, the Agency will give reasonable notice before enforcing the revisions.

• Establishing Operational Order in World Fishing Areas: Other countries are moving progressively to establish fishing zones. Japan's basic position is: (1) coastal countries can only claim a discriminatory right for control over their own territorial waters; (2) unilateral establishment of fishing zones is not valid under international law; (3) establishment of fishing zones is valid only by agreement between countries involved.

The Japan-New Zealand Agreement concluded last year is based on this position. It will be ratified by the Diet. Also, the Agency will request the Diet to approve Japan's participation in the Treaty Concerning Territorial Waters and Adjacent Waters, and in the Treaty Concerning the High Seas. ("Suisan Tsushin," Feb. 14, 1968.)

* * *

1967 TUNA EXPORTS DROPPED 60 PERCENT

Customs data reveal that Japan's exports of frozen tuna in 1967 were only 117,914 metric tons--60 percent of 1966's 195,054 tons. The value of US$45,000,000 in 1967 was only 55 percent of the $81,000,000 in 1966.

Principal Markets by Species						
	Albacore	Yellowfin	Skipjack	Bluefin	Other	Total
	(Metric Tons)					
United States.	19,979	10,337	225	-	115	30,656
Puerto Rico .	14,503	11,507	3,815	-	572	30,397
Am. Samoa .	8,052	1,341	4	-	1,433	10,830
Fiji	2,791	506	-	-	707	4,004
Malaysia. . .	1,422	314	-	4	125	1,865
New Hebrides.	557	137	43	-	226	963
Canada. . . .	1,081	278	-	-	-	1,359
France	309	-	-	-	-	309
Italy	61	27,710	625	778	3,286	32,460
Spain.	-	-	511	-	11	522
Portugal . . .	-	-	271	-	29	300
Guyana . . .	-	206	471	-	122	799
Canary Is. . .	-	18	1,000	-	34	1,052
Denmark. . .	55	-	-	-	598	653
Ivory Coast. .	-	55	347	75	3	480

* * *

SLUMP IN FROZEN TUNA EXPORTS CUTS INSPECTION REVENUE

The Japan Frozen Foods Inspection Corp., commissioned by the Government to inspect export frozen fishery products, faces financial difficulties. The situation was caused by a substantial reduction in inspection revenue during 1967 as frozen tuna exports declined sharply.

In 1967, these exports declined about 50,000 metric tons from 1966. Revenue was cut over US$139,000. The Corporation had to reduce its overseas inspection staffs in Italy, Long Beach, Calif., and American Samoa.

Corporation Fees

The Corporation conducts mandatory inspection of fresh and frozen tuna for export at a fee of 1.3 yen a kilogram ($3.97 a short ton) for albacore, 1.1 yen per kilogram ($3.36 a short ton) for yellowfin, and 0.95 yen a kilogram ($2.90 a short ton) for other tuna species. ("Suisan Nippo," Feb. 26, 1968, and other sources.)

* * *

Japan (Contd.):

LOSING LEAD IN U. S. FROZEN TUNA EXPORT MARKET

A recent Japanese study reveals that frozen tuna exports to the U. S. in 1967 fell below the combined quantity exported to the U. S. by South Korea, Taiwan, and others. Japan exported an estimated 70,000 short tons to the U. S.; the others, 71,000. While 1967 was extremely sluggish for Japanese frozen tuna exports, South Korean and Taiwanese exports to American Samoa and Puerto Rico increased sharply; the uptrend is likely to continue.

Japan Being Undersold

Moreover, Japan is faced with price problems: reportedly, South Korea and Taiwan are exporting tuna to Puerto Rico at prices $10-20 a ton below Japanese prices. Those countries are gaining greater control of the U. S. frozen tuna export market--in quantity and price. ("Suisan Tsushin," Feb. 10, 1968.)

* * *

CUTS TUNA EXPORT QUOTAS TO U. S.

On Feb. 9, 1968, the Japan Frozen Tuna Exporters Association proposed export quotas of frozen tuna to the U. S. for fiscal year 1968 (April 1968-March 1969). The FY 1968 quotas are much below FY 1967's. The proposed quotas were to be presented for approval to the directors' meeting, scheduled for Feb. 21. ("Suisancho Nippo," Feb. 12, 1968.)

New quotas:

	Fiscal Year	
	1968	1967
	(Short Tons)	
To United States		
(a) Shipments from Japan:		
Albacore	30,000	35,000
Yellowfin	25,000	35,000
Loins	6,000	8,000
Additional quota:		
Albacore & yellowfin	10,000	10,000
Loins	2,000	-
(b) Transshipments from Indian Ocean:		
Albacore & yellowfin	4,000	4,000
(c) Transshipments from Atlantic Ocean:		
Albacore	20,000	25,000
Additional quota	5,000	5,000
To Fishing Bases	4,000	4,000
To Italy	45,000	45,000

* * *

EXPORT PRICES OF FROZEN TUNA FOR U. S.

Japanese export prices of frozen tuna for the U. S. in January 1968 were:

	Prod.	Low	High	Average
		(In US$/Short Ton f.o.b. Japan)		
Albacore	rnd.	436 (420)	470 (505)	447 (496)
Yellowfin	g. &g.	400 (410)	413 (460)	402 (440)
Albacore	loins	- (1,056)	- (1,062)	1/985 (1,060)
Yellowfin	loins	830 (970)	876 (1,000)	855 (979)

1/Only one shipment in Jan. 1968.
Note: Figures in parens are those for Jan. 1967.

(Fisheries Attaché, U. S. Embassy, Tokyo, Feb. 7, 1968.)

* * *

EXPORTS OF MARINE PRODUCTS DECLINED IN 1967

Japan's exports of marine products in 1967 were worth US$325,578,000 on a customs-clearance basis, down 9.1 percent from 1966 exports of $358,073,000. This is the first time such exports have declined since Japan recovered her international trade after World War II.

Value of 1967 Marine Product Exports

	1967	1966
	(US$1,000)	
Canned & bottled products	163,011	148,138
Frozen fishery products	82,923	118,365
Pearls	55,037	64,697
Fish oils	9,164	12,527
Salted/dried products	5,658	5,192
Agar-agar	4,228	2,621
Fish meal	1,769	2,619
Nonedible shellfish	1,249	1,200
Seaweed products	1,102	1,187
Dried skipjack loins	806	1,110
Live fish and shellfish	631	417
Total	325,578	358,073

Changing World of Fishing

The decline was ascribed primarily to growing world restrictions on the harvest of fishery resources--and the remarkable advance in fishery production by developing nations. Another factor is growing domestic demand in Japan for high-priced fish. In 1967, this put frozen fish products, such as tuna, in short supply for export. As a result of these developments, frozen tuna exports in 1967 declined about 45 percent in value.

Japan (Contd.):

Other exports that declined markedly were pearls, fish oils, and meal.

On the other hand, canned mackerel and canned salmon gained. ("Suisan Keizai Shimbun," Feb. 13, 1968.)

* * *

1967 CANNED JACK MACKEREL EXPORTS

Japanese canned jack mackerel exports in 1967 totaled 5.07 million actual cases (1 lb. tall 48's and ½-lb. 48's) on a customs-clearance basis. Two-thirds of the exports went to the Philippine Islands. Exports to Malaysia and New Guinea also showed gains, but sales to the U. S. fell by over 60 percent from 1966 figures. ("Suisan Tsushin," Feb. 13, 1968.)

Principal Destination	1967		1966	
	Natural 1/	Others 2/	Natural 1/	Others 2/
	(Number of Actual Cases)			
Philippines	966,337	2,416,737	663,010	1,276,945
Malaysia	503	357,442	21,222	226,982
United States	171,729	10,379	425,116	44,169
New Guinea	151,736	14,510	71,401	11,221
Others	378,759	606,916	333,516	515,169
Total	1,669,064	3,405,984	1,514,265	2,074,486

1/Converted to 1-lb. tall cans, 48 cans per case.
2/Converted to ½-lb. cans, 48 cans per case.

* * *

REPORT ON HERRING ROE IMPORTS, PRODUCTION, PRICES

Table 1 - Imports

From	1967	1966	1965	1964	1963
	(Metric Tons)				
U. S.	294	313	218	52	57
Canada	17	12	6	10	8
USSR	97	113	49	-	-
Norway	21	51	8	5	14
North Korea	-	15	-	-	-
Netherlands	1	-	-	-	-
Total	430	504	281	67	79

Source: Customs Clearance Statistics.

Table 2 - Production

	1967	1966	1965	1964	1963
	(Metric Tons)				
Dried	1/	52	55	79	326
Salted	1/	1,089	641	508	508
Total	1/	1,141	696	587	834

1/Not available.
Source: Japan Fisheries Agency.

Table 3 - Tokyo Average Wholesale Price

	Price 1/	
	Yen/Kilo	US$/lb.
1967	2,300	2.90
1966	2,100	2.65
1965	3,200	4.04

1/For "large" roe, 10-13 cm. in length and 23-35 grams in weight.
Source: Japan Fisheries Agency.

* * *

TO EXPLORE OFF U. S. EAST COAST AND GULF OF MEXICO

The firm Nihon Suisan plans to send an expedition to the U. S. east coast and the Gulf of Mexico this year. In May 1967, it sent the stern trawler "Kaimon Maru," 2,500 gross tons, to the U. S. east coast on a 2-month exploratory cruise. The purpose is to develop new bottomfish grounds for the firm's trawlers now operating off West Africa. There, the fishery is becoming unstable.

The 1968 Plan

For the 1968 trip, Nihon Suisan plans to operate a 2,500- to 4,000-ton vessel. The craft will survey the Atlantic coast of North America south of the area scheduled for investigation this year by the Government research vessel "Kaiyo Maru" (3,500 gross tons). The vessel also will survey the offshore waters of the Gulf of Mexico where Japan has done relatively little exploration.

In the 1967 expedition, the firm lost about US$111,000, but the cruise resulted in the catch of interesting species--such as herring, butterfish, and red snappers. ("Shin Suisan Shimbun Sokuho," Feb. 20, 1968.)

* * *

ENDS EXPLORATORY TRAWLING OFF CHILE

The Nitto Hogei Fishing Co., which had been trawling experimentally for hake, shrimp, and other bottomfish off Chile since early Nov. 1967, ceased in early Feb. 1968. Its two 300-ton trawlers and one 7,477-ton freezership departed for Japan.

The firm had planned to fish until April 1968 in a preliminary resource study prior to joining with Chilean interests.

Japan (Contd.):

Apparently, the survey results were not satisfactory. ("Shin Suisan Shimbun Sokuho," Feb. 23, 1968.)

* * *

FIRM INTERESTED IN FISHING GREENLAND BOTTOMFISH

The Japanese firm Nihon Suisan is showing interest in fishing bottomfish in the Davis and Denmark Straits off the east and west coasts of Greenland. The firm hopes to survey those areas in summer 1968 with its trawler now operating off West Africa.

The two straits, never fished by the Japanese, were worked successfully by the Soviets in 1967. Nihon Suisan's exploration of the region's commercial potential would be in line with its plan to establish a year-round trawl fishery in the Atlantic Ocean.

Government Also Plans Cruise

Besides Nihon Suisan's proposed expedition, the Government has scheduled an exploratory cruise to the northwest Atlantic off Newfoundland in 1968 by its year-old 3,200-gross-ton research vessel "Kaiyo Maru."

The area farther south of Newfoundland, or south of 42° N. latitude off New York, was surveyed in 1967 by the research vessel "Kaimon Maru" (2,500 gross tons) with some success. ("Shin Suisan Shimbun Sokuho," Feb. 6, 1968.)

* * *

GOVERNMENT TO PERMIT ONLY TRIAL SEINING ON DISTANT GROUNDS

The Japanese Fisheries Agency has been deliberating whether to license purse seining in the Atlantic Ocean off West Africa and in the South Pacific Ocean on a full commercial scale. It has decided tentatively to continue permitting only experimental operations. The prevailing view within the Agency is that purse seining in distant waters and its effect on resources are still questionable. Therefore, more study is needed.

Present Fleet

At present, Nichiro Fishing Co. operates a fleet of 4 two-boat seiners and 2 motherships in the West African fishery. It is reported, however, that several firms, including Nichiro, have filed license applications for a total of 40 purse-seine units to operate off West Africa. Attention is focused on how many of those vessels the Agency will permit in the eastern Atlantic fishery. ("Katsuomaguro Tsushin," Feb. 7, 1968.)

* * *

SKIPJACK TUNA SEINING TESTED OFF NEW GUINEA

Taiyo Gyogyo K. K., which has had many tuna seiners in Sanriku waters, now has the 275-ton "No. 3 Hayabusa Maru" there. The firm recently used this vessel to test fish for skipjack in tropical waters north of eastern New Guinea during the Sanriku offseason. The seiner left Nagasaki on Dec. 18, 1967, and returned Jan. 25, 1968. During the test, 49 metric tons (mainly skipjack) were caught, not a large catch. However, the operation was only a test and the usual gear for the Sanriku operation was used.

Fit Vessel To Skipjack

Technicians of the firm's Nagasaki branch were aboard. They said there would be good prospects for this fishery if the vessel's construction, rigging, gear, and methods were improved to fit the habits of the local skipjack. The vessel's catch was erratic: one haul would take 16.5 tons and the next only a few tons.

It has long been said that there is no difference in temperature between surface and deep water off New Guinea. The water is very clear and makes fishing difficult. (Japanese Fisheries News Report, Feb. 14, 1968.)

* * *

RESEARCH VESSEL RETURNS FROM NORTH PACIFIC

On Feb. 15, the Japanese Government-owned research vessel "Kaiyo Maru" (3,210 gross tons) returned to Tokyo after a 15-day exploratory cruise in the North Pacific Ocean. The surveys were conducted west of 160° E. longitude and south of 45° N. latitude, or within Area B under the Japan-USSR Fisheries Treaty.

Japan (Contd.):

Cruise Objectives

Objectives were to learn more about the biology of salmon wintering in the North Pacific Ocean, and to test efficiency of vessel's navigational and fishing instruments in cold weather.

It was established that, even in February, the salmon near 160° E. longitude dwell in waters of 3°-6° C. (37.4°-42.8° F.). Before, it was believed they wintered in warmer temperature zones. There were strong indications that pink salmon were recovering this year, a lean one for the species. ("Suisan Keizai Shimbun," Feb. 19, 1968.)

* * *

TO TIGHTEN RULE ON FOREIGN VESSEL ENTRY INTO 3-MILE ZONE

The Japanese Fisheries Agency wants to prohibit foreign vessels from fishing within the three-mile territorial sea. It plans to strengthen application of the October 1967 Fisheries Law governing fishing by foreign nationals.

Recently, more Soviet and South Korean vessels have been sighted passing through Japanese waters with fishing gear on deck or otter trawl boards towed behind. It has been difficult to determine whether these transits were innocent or attempts to fish stealthily.

Innocent Passage

While the Fisheries Law does not restrict innocent passage, the Agency intends to recognize passage as innocent only if the vessel is not ready to fish. Therefore, it plans to instruct coastal patrol officers to warn transiting foreign fishing vessels in Japanese territorial waters to stow their gear--or move out of these waters. ("Suisan Keizai Shimbun," Feb. 15, 1968.)

* * *

SAFETY PRECAUTIONS TIGHTENED IN JAPAN SEA

The Japanese Government has advised all her fishing vessels in the Japan Sea to observe strictly the safe navigation rules in the Maritime Accident Prevention Law. The Government acted as tension heightened following North Korea's seizure of the U. S. naval vessel "Pueblo."

One crab fishing vessel reported the loss of gear caused by the passage of a huge foreign naval ship; some fishermen claim their vessels were surrounded by foreign patrol boats.

The Precautions

Fishing vessels in the Japan Sea (over 6,350 craft) have been cautioned to display clearly the national flag, refrain from approaching foreign naval vessels, and to avoid South Korea's exclusive fishing zone. The Government also has asked the U. S., the Soview Union, and South Korea to consider the safety of Japanese vessels. ("Minato Shimbun," Feb. 10, 1968.)

* * *

URGES TALKS WITH SPAIN ON 12-MILE FISHING LIMIT

The Japanese trawl industry is urging the Government to negotiate with Spain as soon as possible to safeguard Japanese vessels fishing off Spanish Sahara. Spain extended her exclusive fishing limit to 12 miles in May 1967. Recently, she strengthened enforcement and reportedly seized 14 foreign fishing vessels, including a Japanese trawler, since Dec. 28, 1967.

Japanese Seriously Affected

Japanese trawlers had fished for squid and octopus in productive grounds 6 to 8 miles off the Sahara coast for 9 years until Spain proclaimed the 12-mile limit. The trawlers are now seriously affected by the new law's rigid enforcement. ("Suisan Keizai Shimbun," Feb. 20, 1968, and other sources.)

* * *

HOW JAPANESE PROCESS TANNER CRAB

Most of the zuwai-gani (tanner crab, Chionoecets apilio) taken in the factoryships is frozen. This avoids the costly problem of removing the meat from the shell.

The carapace of the raw crab is removed by hooking the shell over the sharp edge of a removing tool. The body then is broken

Japan (Contd.):

into 2 sets of legs (right and left); any viscera, etc., adhering to the leg is removed by washing. The sets of legs are frozen, packaged, and marketed.

Canned

Zuwai-gani is canned by the same method used for king crab. There are 2 variations used by industry:

Single Cooking	Double Cooking
Raw Crab	Raw crab
Remove carapace	Remove carapace
Cook (100° C. or 212° F.; 15-18 min.)	Cook (60°-70° C. or 140°-158° F.; 10 min.)
Cool (sea water)	Separate legs
Separate legs	Extract meat
Extract	Cook (100° C.; 10-15 min.)
Can	Can

The double-cooking method apparently is used more commonly in the U. S. The Japanese prefer the single-cooking method because the product has a better flavor and a firmer pack.

Meat usually is extracted by hand. The legs are cut in short segments and the meat shaken or pushed out. Frequently, the shell segment will have to be opened by scissors to extract the meat.

The legs of the zuwai-gani are smaller than the king crab's and the meat difficult to remove. The labor for picking zuwai-gani is reported to be 6 times that for king crab. That is why almost all zuwai-gani aboard factoryships is frozen--not canned.

Development of Roller Extractor

Because of labor cost to recover zuwai-gani meat, several companies began to develop in 1967 a "roller" method for meat extraction. A very primitive roller method has been used for years: Pickers frequently use bottles to roll over the leg segments to force out the meat.

In the machine, the crab segments first are fed by belt to a large roller, which cracks the claws and other hard parts; then they go to a second roller, which squeezes out the meat from the segments. The meat is washed into a belt below. The shell passes through the rollers for discard.

The method does not produce good quality crab meat--mainly because water is used to remove the meat from the belt and rollers. Several major companies are now trying to develop a better machine. (Fisheries Attaché, U. S. Embassy, Tokyo, Feb. 6, 1968.)

日本

South Korea

WILL SEND 2 TRAWL FACTORYSHIP FLEETS TO NORTH PACIFIC

Japanese sources report that South Korea plans to send 2 trawl factoryship fleets to the North Pacific in April 1968. One fleet of eight 99-gross-ton trawlers will be led by the 995-ton mothership "Samsu" (owned by Sam Yang Soo Sahn Fishing Co.); the second fleet of about 20 trawlers will be supported by the 8,000-ton freezership "Sinhung" (owned by Sinhung Cold Storage Co.). Both motherships are equipped with meal plants.

Will Fish Until October

The two fleets will fish until October 1968, north of 50° N. lat. and east of 170° W. long., primarily for Alaska pollock and rockfish. Most of the catch will be processed into fish meal for export to Australia. The fleet owners also plan to sell to Japan fish liberalized under Japanese import laws.

* * *

JOINS TWO INTERNATIONAL FISHERIES COMMISSIONS

On Feb. 10, 1968, South Korea's Ministry of Foreign Affairs announced Korea's adherence to the FAO Indian Ocean Fisheries Commission and the FAO Fisheries Committee for the Eastern Central Atlantic. Both are newly established FAO regional fisheries organizations.

The affiliation reflects Korea's interest in bottomfish and tuna fisheries of the Indian and East Atlantic Oceans. (U. S. Embassy, Seoul, Feb. 26, 1968.)

* * *

FISHERIES DEPUTY DIRECTOR IS NAMED

Fisheries Administrator Jae Sik KIM has appointed Hee Un CHANG Deputy Administrator of South Korea's Office of Fisheries filling the post KIM formerly occupied.

CHANG is a graduate of the Pusan Fisheries College and has served the Office of Fisheries for 15 years. He is respected as an able technician and administrator.

South Korea (Contd.):

CHANG was formerly Chief of the Production Bureau. He had major responsibility for informal U. S. Bureau of Commercial Fisheries-Korean exchange program and enforcement of government's policy of abstention from salmon and halibut fisheries in the North Pacific. CHANG will be succeeded in this post by In Soo KIM, an economist with considerable experience in fisheries, and a graduate of the Fisheries College in Pusan.

* * *

FISHES INDIAN OCEAN

Two South Korean tuna longline fleets (totaling 10 vessels) departed Pusan in early January 1968 for the Indian Ocean. They stopped at Shimonoseki, Japan, for about 10 days to refuel and pick up ship supplies, gear, and bait.

Entry of foreign fishing vessels into Japanese ports is restricted under Japanese laws, but the 2 fleets were permitted entry by the Japanese Government because they were not fishing off Japan.

One fleet will operate out of Durban, South Africa, and the other will be based at Penang, Malaysia. Both were scheduled to begin about mid-February 1968. ("Nihon Suisan Shimbun," Jan. 15, 1968.)

Indonesia

JOINT SHRIMP VENTURE WITH JAPAN IN INDONESIA DELAYED

Toyo Menka Kaisha of Osaka, a leading trading firm in Japan, was expected to ask the cooperation of the Japanese and Indonesian Governments in its plan to begin fishing and processing operations off West Kalimantan, Indonesia, starting March 1968.

In fall 1967, the firm had planned to set up a joint shrimp fishing and processing venture in West Kalimantan with major Japanese fishing enterprises, including Kyokuyo Hogei. But the plan was seriously delayed because Japan and Indonesia differed in interpreting territorial waters. ("Nihon Keizai Shimbun," Feb. 13, 1968.)

Pakistan

PAKISTAN AND FAO SURVEY BAY OF BENGAL

A well-planned and systematic survey of the Bay of Bengal has been undertaken by East Pakistan's Fisheries Development Corporation (FDC) together with the UN's Food and Agriculture Organization. East Pakistan possesses vast fisheries resources in marine and inland waters covering 3,656,000 acres. The coastline of the Bay of Bengal alone extends 340 miles.

The Bay's marine resources remain almost untapped. No serious attempt has been made before to exploit East Pakistan's marine resources.

Start Is Made

FDC already has started to exploit the fish resources in the Bay of Bengal pending completion of the survey underway.

In its planning, FDC is relying mostly on data collected by past sporadic surveys. It has decided to use 10 trawlers in the Bay.

FDC is carrying out a scheme to mechanize fishing craft with outboard motors; 285 motors have been received from the Swedish Government under the "Freedom from Hunger Campaign." These were installed in locally built craft and distributed among fishermen on a hire-purchase basis. Nylon nets have also been distributed.

Of the mechanized boats, 91 have been floated in the Kaptai Lake for fishing, and 61 at Cox's Bazar for catching fish in the coastal waters. ("The Pakistan Fish Industry International," Feb. 1968.)

Taiwan

1967 FISHERIES PRODUCTION ROSE 7.7%

Taiwan's fisheries production in 1967 was 458,223 metric tons, an increase of 7.7 percent over 1966.

	1967	1966
	. . . (Metric Tons) . . .	
Deep-sea fisheries	189,097	169,196
Inshore fisheries	186,540	172,330
Coastal fisheries	26,399	25,239
Fish culture	56,187	58,511
Total	458,223	425,276

Taiwan (Contd.):

It is significant that for the first time since 1945 deep-sea production surpassed inshore production. (The margin was small.) This was due to an increase in the number of large tuna long-liners (over 50 gross tons); they numbered 260 at the end of 1967.

Production from fish culture was set back due to insufficient supply of milkfish fingerlings. Normally, 160 million fingerlings are required for the 15,000 hectares of brackish water ponds; in 1967, only about 40 million fingerlings were available.

The landings by fishermen of the Matsu and Quemoy Islands (under military jurisdiction) are not included in total. These were an estimated 5,000 metric tons in 1967.

1967 Exports

Exports of fishery products totalled US$18.1 million in 1967.

	Quantity	Value
	Metric Tons	US$
Frozen fish (mostly tuna)	39,109	13,771,000
Frozen shrimp	1,436	3,373,000
Other species	300	1,000,000
Total	40,845	18,114,000

Large Purse-Seine Operation

A Taiwanese fishing company chartered large purse seiners from Japan to catch spotted mackerel and horse mackerel southwest of Okinawa. The fleet of 7 boats, including a net boat, one light boat, two search boats, and three fishery transports, arrived at Keelung (Taiwan) in November 1967 and started fishing in December. By the end of February 1968, 350 tons of mackerels had been landed. Most of the fish will be canned for export. (Contributed by T. P. Chan, Chief, Fisheries Division, Joint Commission on Rural Reconstruction, Taipei, Republic of China.)

Hong Kong

COMMUNIST CHINA'S FISH EXPORTS RISE

In 1967, Mainland China sent to Hong Kong fishery products worth US$26.4 million--23 percent more than in 1966. The increase occurred despite an overall decrease of 18 percent in total Mainland Chinese exports to Hong Kong. The reason for this is that fishery exports, unlike others, are carried in small vessels--and were not affected by the turmoil of the 1967 "cultural revolution."

Imports from China in 1967 made up 64 percent of fishery sales on the Hong Kong market. (U. S. Embassy, Feb. 23, 1968.)

* * *

FISHERIES EXHIBITION HELD

The eighth Hong Kong Fisheries Exhibition was held Jan. 29-Feb. 3, 1968, three years after the last one. It was considered a success: 44 exhibitors, including 2 U. S. firms and 3 local sales representatives for U. S. products, participated. Despite poor weather, there was a very large attendance. Considerable interest was shown in U. S. electronic equipment, outboard motors, and antifouling paints. (U. S. Consulate, Hong Kong, Feb. 14, 1968.)

Southeast Asia Center Is Closer to Reality

The Southeast Asia Fisheries Training Center moved closer to reality when the agreement establishing it was signed by Philippines, Malaysia, and South Vietnam in mid-January 1968. On Feb. 7, the Japanese Government, which will play a leading role in the organization and smooth functioning of the center, appointed M. Morizawa (Deputy Director of the Japanese Fisheries Agency) as its representative on the center's Council of Governors. Other countries are now selecting their council members.

The Council of Governors will appoint staff, collect funds from members, and approve new members.

The center is designed to increase food-from-the-sea programs of members through applied research and training. More powered fishing vessels are needed and improved fishing equipment and techniques. Finding new resources and skilled fishermen to exploit these resources are also program priorities.

Thailand

TRENDS IN THE FISHERIES

Fish are a major part of the Thai diet, The local annual catch amounts to over 700,000 metric tons. Individual fishermen, however, earn only marginal incomes.

An estimated 90 percent of the fishermen work alone and make subsistence catches. A few small cooperative ventures have at most 2 or 3 boats averaging 20 gross tons.

Influential Chinese Traders

The fishing community consists of about 80,000 families who maintain about 5,000 boats ranging from 10 to 50 tons. The catches are bought from the boats by 13 major Chinese traders. The traders are influential because they actually finance the entire fishing industry. The capital turnover of each of the 13 fish wholesalers is more than 10 million baht (US$475,000). But the wholesalers still are not willing to finance improvements in the fleet; the only industry in which they would invest is fish processing.

Buying fresh fish. (Photo: FAO)

Old Methods Used

The Thai are not seamen by tradition or inclination. Local fishermen are not very interested in deep-sea fishing, large boats, and electronic gear. They are not especially eager to learn modern techniques of commercial fishing. More sophisticated equipment, such as electronic devices and larger boats, are used only by the Government for research purposes.

Japanese Start Training School

The Japanese Government recently opened a fishermen's training school in Thailand. The school started with two, 400-ton, fully equipped vessels that can each accommodate 50 students and several Japanese technical advisers. Today, few Thai fishermen have any concept of sonar and other fish-finding equipment. Likewise, fishing boat builders prefer traditional methods and equipment.

School Could Change Things

After the Japan-sponsored school operates for a while, and new ideas get back to more fishermen in the villages, there may be changes in Thai attitudes and methods. A demand may develop for electronic depth finders, fish-finding sonar equipment, navigation equipment, marine propulsion and steering gear, fishing boats 100 to 200 gross tons, marine engines of 300-400 horsepower, winches, wire ropes and trawl nets, shrimp boats, and ice plants using sea water designed for use aboard ships.

Fish wholesalers in Phuket recently asked about purchasing U.S.-made ice plant equipment. The real market and need for U.S. goods in Thailand is in fish processing. The wholesalers buy up the fish cheaply from individual fishermen and resell it at sizable profits. They are financially able and motivated to buy more efficient U.S. quality goods. (U. S. Embassy, Bangkok, Mar. 7, 1968.)

SOUTH PACIFIC

Landings of Skipjack and Yellowfin Tuna at Papeete Market (Tahiti)

Throughout French Polynesia, there is a subsistence fishery for skipjack (Katsuwonus pelamis) and yellowfin (Thunnus albacares) tuna. In Tahiti, these fish are caught from fishing boats usually called "bonitier." The boats are diesel powered and about 30 feet long. They do not have refrigeration and have to return each afternoon with the catch. This limits the fishery area to the immediate vicinity of Tahiti.

The fish are caught with pole and line by a two- or three-man crew. The Polynesian pearl-shell lure is in common use, although other types are also employed. Live bait is not used. In recent years, trolling lines have been used when searching for surface schools of tunas. More detailed information about this fishery has been presented in Commercial Fisheries Review (Van Campen, 1953).

Boats and Landings Increased

The number of boats employed in this fishery has increased steadily in recent years. The number of fishing craft for 1954-1967 is shown in figure 1. There were 15 boats in 1954 and 107 in 1967--more than 7 times more.

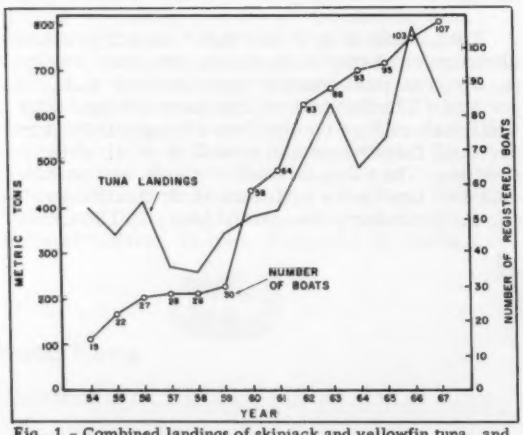


Fig. 1 - Combined landings of skipjack and yellowfin tuna, and numbers of boats engaged in the tuna fishery.

Also shown in figure 1 are landings for that period. In general, landings, have been increasing with the number of boats employed in the fishery. During 1954-1967, the catch of skipjack and yellowfin tuna fluctuated from 259 to about 731 metric tons. As the fish are gilled and gutted at sea, the weights of landings reported here are for eviscerated fish.

Monthly landings of skipjack tuna at the Papeete Municipal Market for the period 1954-1967 are shown in table 1[1/]. The same information for yellowfin tuna is shown in table 2[1/]. Nearly all skipjack caught by the Tahiti fleet pass through the Papeete Market. This used to apply also to yellowfin but,

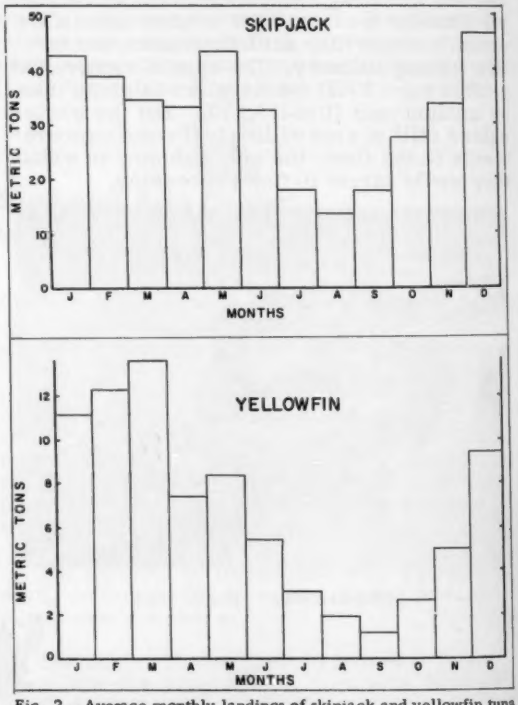


Fig. 2 - Average monthly landings of skipjack and yellowfin tuna (based on the data for the period 1954-1967).

1/All statistics are in the appendix to reprint (Separate No. 813) of this article. For a free copy of the Separate, write to Office of Information, U. S. Department of the Interior, Fish and Wildlife Service, BCF, 1801 N. Moore St., Arlington, Va. 22209.

U. S. DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Sep. No. 813

beginning in recent years, the larger yellowfin are often sold directly to store or hotel owners and are not included in market statistics.

The monthly landings of skipjack and yellowfin are illustrated in the two panels of figure 2. There is considerable variation from month to month. The lowest catches of both species occur rather consistently during the austral (Southern) winter.

Longlining

In the general area of Tahiti, tunas are also caught on longline gear, primarily by Japanese longliners. (For details, see journal "Tuna Fishing.") Catches of skipjack by longline gear are negligible because this gear appears effective only for deep-swimming tunas, such as yellowfin, bigeye (T. obesus), albacore (T. alalunga), and various spearfishes (Istiphoridae and Xiphiidae).

In 1961-1965, a French fisherman fished for tunas with longline gear but later transferred his operation to the Cook Islands. In 1967 a change occurred in the Tahitian tuna fishery. Several bonitier operators felt that by converting their boats for longlining, they could catch more tunas. By the end of 1967, there were already three such converted boats. (See figure 3.) The converted boats fish with gear consisting of 60 baskets (6 hooks to a basket). On the average, they catch 4 kg. of tunas and spearfishes per basket per day. Like the original bonitiers, these boats lack refrigeration and operate only on a daily basis.

Fig. 3 - Tahitian tuna boat converted for longlinging. (Photo: M. Brun.)

Tahiti's Fishing Future

The authors believe that because of Tahiti's geographical position in relation to the Pacific tuna fishing grounds, it will become eventually either a center for a locally based, longline fishery--or a transshipping base for one or more of the foreign tuna longlining fleets. These fleets of Formosa, Japan and Korea are already well developed, while the nucleus of the Tahitian fleet is very small.

LITERATURE CITED

TUNA FISHING
Investigative Society of Tuna Fishery (afterwards All Japan Investigative Conference of Tuna). Maguro gyogyō. Magur Maguro gyogyō kenkyū-kai (afterwards Zenkoku katsuo-maguro kenkyū kyōgi-ka). Miura City, Japan.

VAN CAMPEN, W. G.
1953. Tuna Fishing in Tahiti. "Commercial Fisheries Review," vol. 15, no. 10 (October), pp. 1-4.

By Michel Brun
Boîte Postale 567
Papeete (Tahiti), French Polynesia

and

Witold L. Klawe
Inter-American Tropical Tuna Commission
La Jolla, Calif. 92037, USA

Australia

ARTICLES ON SHRIMP FISHERIES

The January 1968 issue of "Australian Fisheries Newsletter" contains a 31-page review of shrimp in northern Australia. It describes how scientists, technologists, administrators, and fishermen are cooperating in a program to develop the resource. There are articles on the industry, processing and packaging methods, marketing, vessels and gear, and biology of the shrimp. The review is illustrated.

The Newsletter is published by the Fisheries Branch, Department of Primary Industry, Canberra, A.C.T., 2600, Australia.

American Samoa

REPORT ON 1967 FISHERIES

The canning of tuna and the manufacture of byproducts continued to dominate the economy of American Samoa in fiscal year 1967 (July 1, 1966-June 30, 1967). Two U. S. tuna canning companies operate factories on Pago Pago Bay, one of the finest natural harbors in the South Pacific. An American Can Co. plant, located between the 2 canneries, feeds locally manufactured cans to both processing plants. Van Camp Seafood, a division of Ralston Purina Co., came to American Samoa in 1954; Starkist Samoa, a division of H. J. Heinz Co., started in 1963. At the end of FY 1967, Starkist employed about 500 Samoans, compared with 382 at the end of FY 1966. Van Camp employed about 450 Samoans, about the same as at the end of FY 1966. These employes work in processing and maintenance positions.

Foreign Fishermen Provide Tuna

Samoans do not like to go to sea for weeks to supply these canneries, so the tunas are provided by Asian fishermen whose companies work under contract with the canneries. At the end of FY 1967, over 4,000 Nationalist Chinese, Korean, and Japanese fishermen, working on 220 vessels brought to Samoa from Asia, were supplying fish. At the end of FY 1966, about 2,500 fishermen and 135 vessels were working for the 2 canneries.

The canneries combined employed at end of FY 1967 about 48 percent Nationalist Chinese, 30 percent Koreans, and 21 percent Japanese.

The Vessels

Each fishing vessel uses most of its interior space for freezing and storing freshly caught tuna. It is at sea 60-90 days; some vessels go as far as 600 miles from Pago Pago. An average 60 tons of tuna is brought back. The vessel stays in port 4 or 5 days for offloading and provisioning.

Exports

In FY 1967, 2,359,860 cases of canned tuna fish worth US$25,438,615 were exported. Also: 324,077 cases of pet food (from tuna byproducts) worth $1,102,354; 3,873,300 pounds of fish meal, $196,850; 1,175.6 tons of frozen fish, $420,527; and 890 cases of wahoo, $6,358.

Seek Bait Species

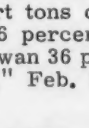
Potential bait species were surveyed for possible skipjack fishing. Several possibilities were mullet, silver sides (Atherinidae), anchovy (Engraulidae), and round-bodied sardine (Dussumieriidae). Of the 4, many mullets were seen in numerous bays and coves along Tutuila's southern coastline. Large numbers of round-bodied sardines were seen in Pago Pago Harbor. Of the numerous coves and bays, Faga'alu, Alofau, and Tafuna lagoon are most ideal for baiting. It is difficult to assess the availability of bait in supporting a hand-line tuna industry at this time. ("American Samoa 1967 Annual Report to the Secretary of the Interior.")

* * *

TAIWAN VESSELS PREDOMINATE IN TUNA FISHERY

In Jan. 1968, there were 164 foreign tuna vessels operating out of American Samoa: 85 belonged to Taiwan, 58 to South Korea, and 21 to Japan. One year earlier, Taiwan had 58, South Korea 56, and Japan 25 vessels working out of that island.

In Jan. 1968, the 3 countries delivered about 2,354 short tons of tuna to American Samoa--Japan 16 percent, South Korea 48 percent, and Taiwan 36 percent. ("Katsuomaguro Tsushin," Feb. 26, 1968, and other sources.)



AFRICA

South-West Africa

1968 PILCHARD CATCH MAY HIT 1,750,000 TONS

The total pilchard catch off the South-West African coast in the 1968 season will almost certainly set a record. It will be well over a million tons and could approach 1.75 million tons.

Assuming that all 8 land-based pilchard factories catch and process their full quota, this will result: The basic catch will comprise 498,000 short tons for the 5 factories now on a 99,600-ton quota; plus 270,000 tons for the 3 plants restricted to 90,000 tons each. Add, too, another 99,600 tons for the new Sarusas Development Corp. license and the 99,600-ton quota allocated to the white-fish licensees. (This is provided they reach a practical agreement on partial amalgamation.)

1.3 Million Tons

This gives 967,200 tons. To this can be added a probable 350,000 tons taken by the 2 factory vessels, "Willem Barendsz" and "Suiderkruis." So the catch processed by South-West African shore and sea-based ventures will probably reach 1.3 million tons. But this takes no account of the catching effort by foreign nations interested in pilchard, headed by the Soviet Union.

The USSR has operated trawlers and factory vessels off the territory. Their combined pilchard catch may well exceed a conservative estimate of 300,000 tons. In May, the Soviet fleet probably will be joined by the giant "Vostok," 43,000 tons, which will dominate the world factoryship arena. She will be fed by her own fleet of fibre-glass catchers. How she will fare in her first season out from her builder's yard is conjecture. But it would be surprising if 300,000 tons were not fed into her reduction plant before the end of December. ("South African Shipping News and Fishing Industry Review," Jan. 1968.)

* * *

FACTORIES PROCESSED RECORD 790,000 TONS IN 1967

In 1967, a record catch of well over 1.5 million short tons was landed by the combined fleets of South and South-West Africa. Although the figures are incomplete, it is clear that the Republic's bumper catch again was eclipsed by South-West Africa's; there 790,000 tons of fish were caught and processed.

The 790,000 tons include spiny lobster caught at Luderitz, seasonal snoek, and a small trawl catch. The bulk is over 780,000 tons of pilchards and a few thousand tons of anchovy. The latter were processed into 185,000 short tons of fish meal, 37,000 long tons of fish-body oil, and 167 million pounds of canned fish. The last figure was only 6 million pounds short of the 1960 record.

In South-West Africa, the pilchard comprised about 98 percent of the total catch of around 790,000 tons; in the Cape west coast fishery, the pilchard catch slumped further in 1967--to 81,000 tons or 14 percent of the total catch. ("South African Shipping News & Fishing Industry Review," Jan. 1968.)

Tunisia

REPORT ON FISH CANNING INDUSTRY

The food preservation industry in Tunisia has been an important element in the economy since World War II. It employs 5,000 people. Indirectly, it assists agriculture, container makers, shippers, and retailers. More important, canned food is one of Tunisia's few manufactured exports. In 1966, it provided US$4 million worth of foreign exchange.

After the war, French demand in Tunisia and in France spawned many small canning firms generally owned and managed by French and Italians. The first plant of any size was located at Sidi Daoud, across the Bay of Tunis from Tunis. It processed tuna and sardines. Other firms developed in the fish industry. In the early 1950s, the canning of tuna and sardines in olive oil was introduced.

Tunisia (Contd.):

It was not until the mid-1950s, however, that vegetables and fruits were canned in any quantity.

5 Companies Can Fish

The canning of fish is limited to 5 companies. One is the "Office National de Peche" (ONP), which controls 63 percent of fish canning, as well as the fishing fleets and fresh-fish marketing. ONP control has hampered the growth of private canning companies. ONP has a tuna-canning factory in Sidi Daoud on the Bay of Tunis and 5 other plants in the fishing ports of Sousse and Mahdia (sardines).

The largest privately owned and operated fish-canning company is Sfar. It has 8 percent of the Tunisian canned goods market. Sfar began in 1961 as a major fish packer, but recently it has begun to shift to vegetables and fruits. However, its growth prospects and those of the private canning sector in general are not encouraging. This is because of competition from Government-supported companies and cooperatives that have easier access to capital--and largely control allocation of raw materials. Many producers feel that private initiative in the canning industry is being smothered by public competition. They feel it is a competition not strictly subject to the economic discipline of profit and loss, and has the insurance of Government backing.

Planned Marketing In Infancy

The concept of planned marketing is in its infancy in Tunisia, especially as it applies to export sales. Domestic distribution of canned goods is improving as the traditional "Djerbian" retail outlet gives way to the new commercial units. Domestic demand also is increasing. This is due primarily to the growing institutional requirements for preserved food. It is aided also by a changing way of life that leaves less time for domestic chores.

Still, the only canned-food product with a solid domestic market is tomato paste. About 40 percent of Tunisian canned-food production is exported, 73 percent of it to France. During the past 2 years, France has offered duty-free quotas for 2,500 tons of canned fish, 4,000 tons of canned vegetables (including not more than 500 tons of tomato paste), and 1,000 tons of sugared fruit preserves.

Industry Outlook Cloudy

The outlook for the Tunisian canning industry is cloudy. Much needs to be done to improve quality, increase quantity, and reduce the cost of products. Much depends on exterior market conditions over which Tunisia has little or no control.

It has been suggested by the International Bank for Reconstruction and Development and others that Tunisian canning companies negotiate a working relationship with a large U. S. or European firm to acquire the necessary technical skills. One U. S. company looked into the possibility of licensing a local firm to use its process and sell to Europe under its label. This fell through when problems of bringing home dinar earnings were met. Also there appeared to be an insufficient supply of fruits and vegetables. However, another U. S. company recently has shown interest. (U. S. Embassy, Tunis, Jan. 29, 1968.)

INDEX

Page

UNITED STATES:

1 .. President Asks $516 Million for Marine Science Affairs in Fiscal 1969
8 .. Steelhead Eggs Are Fertilized With Frozen Sperm for First Time
9 .. Interior Suggests Legislation to Control Oil Pollution
9 .. Foreign Fishing Off U. S. Atlantic Coast Discussed
10 .. 1968 Great Lakes Fish Stocking Underway
10 .. Great Lakes Production 1967 and 1966
Oceanography:
11 .. Scripps' "Argo" Uses Computer and Satellites on Global Cruise
11 .. Coast Guard Leads Data Buoy Development
12 .. New Hydrographic Survey Vessel Commissioned
States:
Florida:
13 .. Mass Culture of Pink Shrimp and Pompano Studied by Miami U.
Oregon:
13 .. Fish Commission Seeks to Establish Abalone
Texas:
14 .. EDA Approves Funds for Brownsville Harbor Expansion
14 .. FY 1966-67 Landings
14 .. Galveston Bay Yields 6,000,000 Pounds of Seafood
14 .. Big Fish in Bays Attract Illegal Netters
North Carolina:
15 .. 1967 Landings Down 10.5%
Alaska:
15 .. Scallops: To Shuck or Not to Shuck ~ At Sea
15 .. New Scallop Fishery Develops Rapidly
16 .. Marine Science Complex Planned
California:
16 .. Basking Shark Fishery Launched
16 .. Interest in Dried Seaweed Increases
Washington:
16 .. Hake Fishery Cut As Market Demand Drops
Bureau of Commercial Fisheries Programs:
17 .. 'Oregon II' Tests Sonar and Longlines on First Cruise
19 .. 'Gilbert' Studies Thermocline West of Hawaii
19 .. Calico Scallops Still Plentiful Off E. Florida, 'Oregon' Finds
21 .. Modified Universal Trawl Tests Well
21 .. Report on Pacific Saury
22 .. Genetic Composition of South Pacific Skipjack Tuna Studied
23 .. Tag Offshore Lobsters
24 .. Ann Arbor Holds Training Seminar
24 .. Miami Lab Has New Radio Station
24 .. 'Geronimo' Is Taken Out of Service
24 .. BCF and Industry Promote Rainbow Trout
25 .. Safety Bulletins Issued on Explosives, Radar Use
ARTICLES:
26 .. Detection of Fish Schools by Sonar (Eastern Tropical Pacific, July-November 1967, by Robert I. McClendon
30 .. How Lake Superior Gill Net Vessel Was Converted to Trawler, by Warren Handwork

Page

INTERNATIONAL:

36 .. U.S. and Mexico Agree on Fishery Zones
36 .. EEC Reports on Fisheries
36 .. FAO Fishery Committee for Eastern Central Atlantic Being Organized
36 .. ICES Convention to Enter into Force
37 .. Japanese-Australian Shrimp Ventures Planned
37 .. 7 Weeks of World Baleen Whaling
37 .. Sweden Supplies FPC to Ethiopia
38 .. World Fish Meal Production in 1966 and 1967
38 .. FEO Exports in 1966 and 1967
38 .. ICES Scheduled Meetings
38 .. Sweden Will Aid Iran's Fishery Development
39 .. International Fisheries Reference
39 .. UN'S Caribbean Vessels Keep Busy
40 .. Breadth of Territorial Seas and Fishing Jurisdiction Claimed by Members of the United Nations
FOREIGN:
Canada:
42 .. British Columbia Fishermen's 1967 Earnings Fell
42 .. Licenses Lobster Fishermen
42 .. Fire Destroys New Fish Meal Plant
Europe:
Norway:
43 .. Fishing Industry Faces Severe Crisis
43 .. Devaluation Hurts Fishing Industry Most
44 .. 1967 Exports of Fishery Products
44 .. New Norwegian Group Granted Export Rights to U. S.
Denmark:
44 .. 1967 Fishery Exports Soared But Value Same As 1966
45 .. Industrial Fishery Is Excellent
45 .. Fishermen Buy Control of Fish Meal Plant
45 .. Faroese Order More Fishing Vessels from Norway
West Germany:
46 .. Fishing Industry Declines Sharply
Iceland:
46 .. Limitations Put on Herring Fishery
Spain:
46 .. Tuna Seiner "Sarasua" Tied Up
Netherlands:
47 .. Report on 1967 Fish Meal Imports
United Kingdom:
47 .. White Fish Authority Raises Interest Rates
47 .. Development Programs Planned
Italy:
47 .. Canned Tuna Production Is Still Rising
Belgium:
48 .. Fishery Landings, 1961-67
Yugoslavia:
48 .. Aids Congo
USSR:
48 .. Continental Shelf Law Passed
48 .. Buys Frozen Fish from British
49 .. Research in Equatorial Atlantic Ends
49 .. Fishing Atlas Published
Mid East:
Cyprus:
49 .. Prospects for a Fishing Industry
Latin America:
Mexico:
50 .. 1967 Catch Rose 13 Percent Above 1966's
50 .. Nationalization of Fishing Industry

Index continued page 68.

INDEX (CONTINUED)

Page

FOREIGN (Contd.):
Latin America (Contd.):
Mexico (Contd.):
51 .. 1967 Landings Rose at Pilot Fishing Port of Alvarado
51 .. Japan-Mexico 12-Mile Fishing Zone Talks Resume
Peru:
51 .. Anchovy Fishing Season Reopens
51 .. Fish Meal Production and Holdings
52 .. Fish-Meal Producers Appeal to Government
52 .. Consultants Recommend Hake Industry to Government
52 .. Shipyard Builds 6 Large Purse Seiners
Asia:
Japan:
53 .. Fisheries Director Outlines Positions and Plans
53 .. 1967 Tuna Exports Dropped 60 Percent
53 .. Slump in Frozen Tuna Exports Cuts Inspection Revenue
54 .. Losing Lead in U. S. Frozen Tuna Export Market
54 .. Cuts Tuna Export Quotas to U. S.
54 .. Export Prices of Frozen Tuna for U. S.
54 .. Exports of Marine Products Declined in 1967
55 .. 1967 Canned Jack Mackerel Exports
55 .. Report on Herring Roe Imports, Production, Prices
55 .. To Explore Off U. S. East Coast and Gulf of Mexico
55 .. Ends Exploratory Trawling Off Chile
56 .. Firm Interested in Fishing Greenland Bottomfish
56 .. Government to Permit Only Trial Seining on Distant Grounds
56 .. Skipjack Tuna Seining Tested Off New Guinea
56 .. Research Vessel Returns from North Pacific
57 .. To Tighten Rule on Foreign Vessel Entry into 3-Mile Zone
57 .. Safety Precautions Tightened in Japan Sea

Page

FOREIGN (Contd.):
Asia (Contd.):
Japan (Contd.):
57 .. Urges Talks with Spain on 12-Mile Fishing Limit
57 .. How Japanese Process Tanner Crab
South Korea:
58 .. Will Send 2 Trawl Factoryship Fleets to North Pacific
58 .. Joins Two International Fisheries Commissions
58 .. Fisheries Deputy Director Is Named
59 .. Fishes Indian Ocean
Indonesia:
59 .. Joint Shrimp Venture with Japan in Indonesia Delayed
Pakistan:
59 .. Pakistan and FAO Survey Bay of Bengal
Taiwan:
59 .. 1967 Fisheries Production Rose 7.7%
Hong Kong:
60 .. Communist China's Fish Exports Rise
60 .. Fisheries Exhibition Held
60 .. Southeast Asia Center Is Closer to Reality
Thailand:
61 .. Trends in the Fisheries
South Pacific:
62 .. Landings of Skipjack and Yellowfin Tuna at Papeete Market (Tahiti), by Michel Brun and Witold L. Klawe
Australia:
63 .. Articles on Shrimp Fisheries
American Samoa:
64 .. Report on 1967 Fisheries
64 .. Taiwan Vessels Predominate in Tuna Fishery
Africa:
South-West Africa:
65 .. 1968 Pilchard Catch May Hit 1,750,000 Tons
65 .. Factories Processed Record 790,000 Tons in 1967
Tunisia:
65 .. Report on Fish Canning Industry

Created in 1849, the Department of the Interior—America's Department of Natural Resources—is concerned with the management, conservation, and development of the Nation's water, fish, wildlife, mineral, forest, and park and recreational resources. It also has major responsibilities for Indian and Territorial affairs.

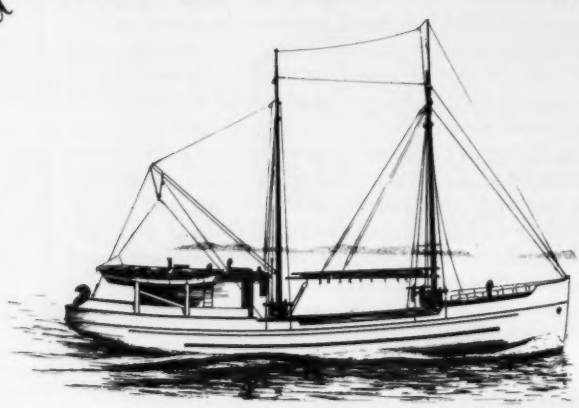
As the Nation's principal conservation agency, the Department works to assure that nonrenewable resources are developed and used wisely, that park and recreational resources are conserved for the future, and that renewable resources make their full contribution to the progress, prosperity, and security of the United States—now and in the future.

UNITED STATES DEPARTMENT OF THE INTERIOR

U.S. FISH AND WILDLIFE SERVICE

BUREAU OF COMMERCIAL FISHERIES

Bureau of Commercial Fisheries



Assists Halibut Industry

The Bureau is cooperating with the Halibut Association of North America to increase consumer awareness of North Pacific halibut and to assist the industry in marketing the expected large spring and summer supply. The Halibut Association and BCF are providing halibut steak recipes and photographs to newspaper food editors. The Halibut Association is sponsoring a series of television "spot" announcements in color which include identification of local participating retailers. In addition, the Department of Agriculture is assisting by including halibut steaks on its April "List of Foods in Plentiful Supply."

The Bureau of Commercial Fisheries is encouraging the food trade industry to participate in the halibut campaign. Further details on the promotion may be obtained from the Branch of Marketing, Bureau of Commercial Fisheries, 1801 North Moore Street, Room 408, Arlington, Virginia 22209.